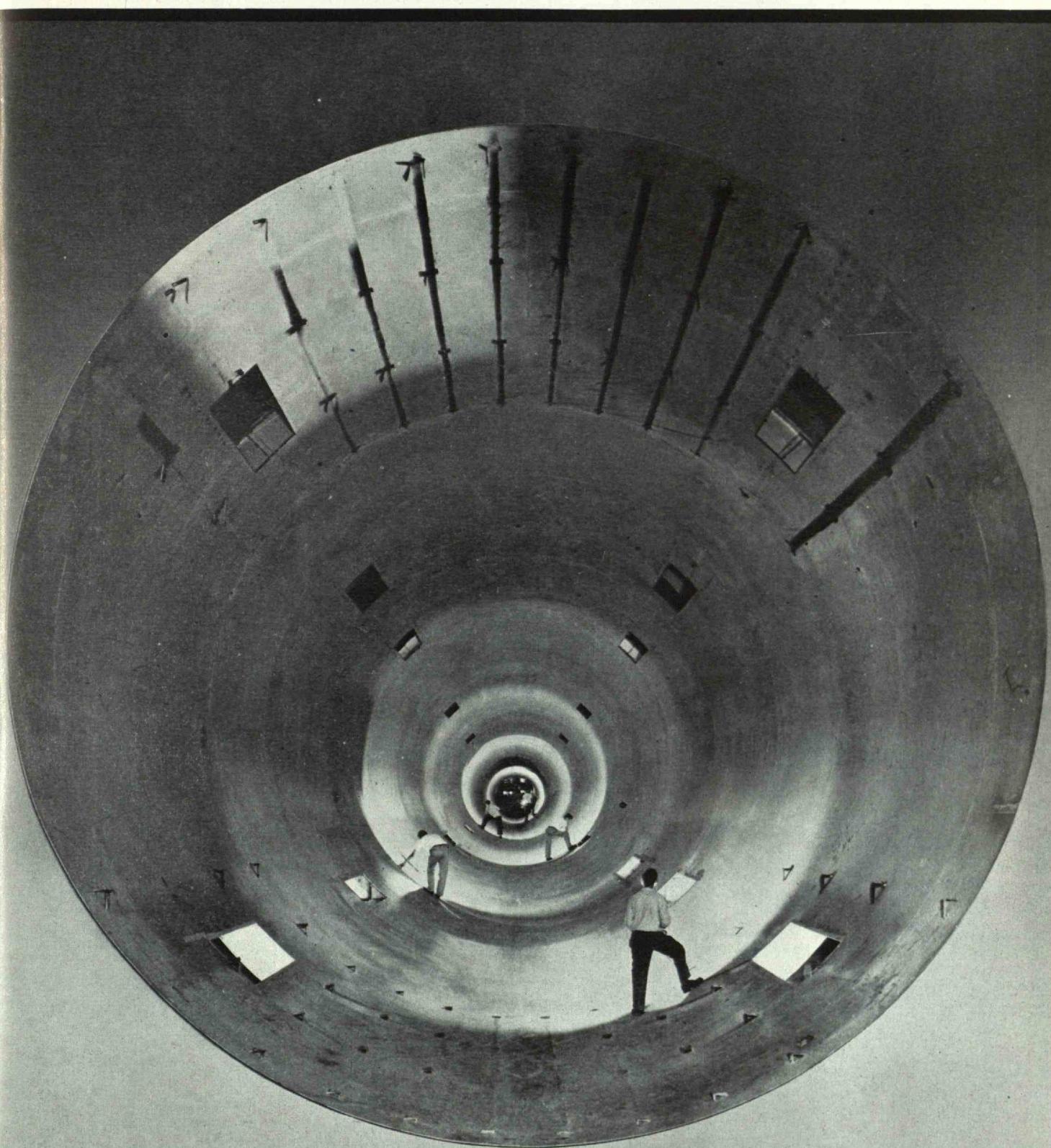


TECHNOLOGY

REVIEW *February 1951*



technology review

Published by MIT

This PDF is for your personal, non-commercial use only.

Distribution and use of this material are governed by copyright law.

For non-personal use, or to order multiple copies please email
permissions@technologyreview.com.



More Steam

FROM SUGAR CANE

Spent sugar cane—called bagasse—has long been burned to provide steam in sugar mills. But until recently it has never been a satisfactory fuel... handling was difficult, shutdowns for cleaning boilers frequent.

About five years ago, Combustion, long a pioneer in fuel burning technique, decided to seek a better method of burning this fuel. Accordingly, a car-load of bagasse was procured and shipped to one of C-E's plants. Following exhaustive studies of the special problems of feeding and burning, designs were developed and a pilot installation built. Extensive testing and further development produced results that proved the soundness of the experimental design.

The next step was a commercial installation at a large sugar plantation. Performance exceeded expectations... uninterrupted service throughout the grinding season, greatly increased boiler capacity, substantially improved efficiency and simplified operation. Word of these results spread quickly and many other installations followed.

Combustion's research and engineering staffs had put together a unit that revolutionized bagasse burning... a unit that has brought an opportunity to sugar-producing plants throughout the world for savings running to millions of dollars annually.

Of course the vast majority of C-E boiler installations burn coal, oil or gas, but even with these basic fuels, the wide variations in quality and burning characteristics makes almost every installation a different problem. That is why Combustion's resources of experience, equipment and facilities assure you the right equipment for your steam requirements.

Combustion's *applied* experience—focused on your particular needs—is freely available. A letter stating your problem will receive our immediate attention.

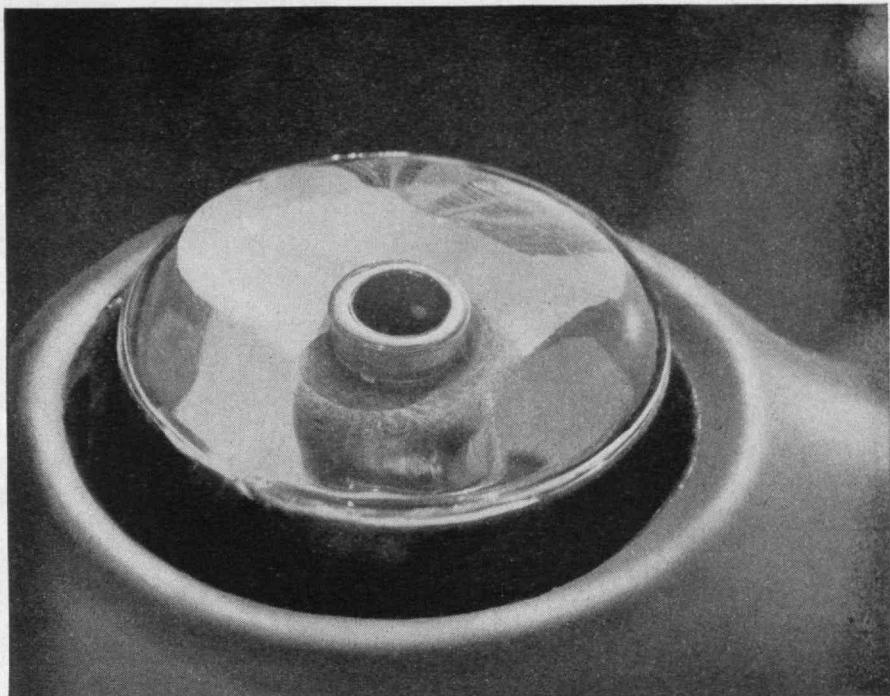
B-426



**COMBUSTION ENGINEERING—
SUPERHEATER, INC.**

200 Madison Avenue • New York 16, N. Y.

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT



(IT WILL BENEFIT A LOT OF FOLKS!)

WHAT IS IT?

heat-therapy lamp T-V color tube drinking fountain



ITS HIGH QUALITY METAL, in billet form, had surface imperfections removed by grinding wheels. Metal products of every type are made from billets ground by high-speed, fast-cutting wheels of Norton Alundum abrasives.



ITS HIGH POLISH came from another abrasive operation. Such products as table knives, laboratory instruments, telescope lenses and marble monuments are also polished with Norton Alundum or Norton Crystolon abrasives.

WERE YOU RIGHT? It's a drinking fountain. But as far as Norton is concerned, it could easily have been either of the other two. Because wherever there's grinding, cutting, polishing or any of countless other operations to be done, Norton — as the world's largest manufacturers of abrasives and abrasive products — is very much in the picture.



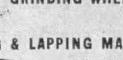
TRADE MARK REG. U. S. PAT. OFF.

Making better products to make other products better

ABRASIVES



GRINDING WHEELS



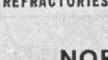
OILSTONES



ABRASIVE PAPER & CLOTH



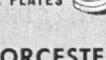
REFRACTORIES



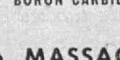
GRINDING & LAPPING MACHINES



LABELING MACHINES



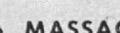
NON-SLIP FLOORING



CERAMIC SURFACE PLATES



BORON CARBIDE PRODUCTS



NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

BEHR-MANNING, TROY, N. Y. IS A DIVISION OF NORTON COMPANY



We squeezed first . . . and

Now IT'S YOUR TURN. Pick up one of those new pliant, unbreakable plastic bottles. Squeeze it. Feel how it gives under your hand, then see how it comes right back for more.

That's polyethylene (just say POLLY-ETHEL-EEN), one of the exciting new miracle plastics produced by the people of Union Carbide.

But before you squeezed it, they squeezed ethylene gas under terrific pressure and carefully controlled conditions. Result: the molecules of gas were permanently rearranged into long lines—one of the marvels of modern chemistry. And then out came this tough, flexible plastic utterly unlike any other material—natural or man-made.

Why do you find the people of Union Carbide leading in the development of polyethylene?

Because working with tremendous pressures, high vacuum and extremes of heat and cold is part of their everyday

jobs. By the use and control of these forces they supply the world with a wide variety of plastics and the raw materials from which a multitude of synthetic fibres are made. They also make hundreds of other basic materials essential to modern science and industry.

Perhaps your business could profit by the use of some of these materials. Why not ask us about them?

FREE: Learn more about the interesting things you use every day. Write for the illustrated booklet "Products and Processes" which tells how science and industry use Union Carbide's Alloys, Chemicals, Carbons, Gases and Plastics in creating things for you. Write for free booklet A.



**UNION CARBIDE
AND CARBON CORPORATION**

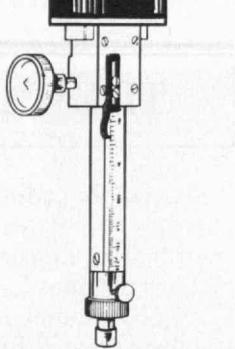
30 EAST 42ND STREET  NEW YORK 17, N. Y.

Trade-marked Products of Divisions and Units include

SYNTHETIC ORGANIC CHEMICALS • LINDE Oxygen • BAKELITE, KRENE, and VINYLITE Plastics

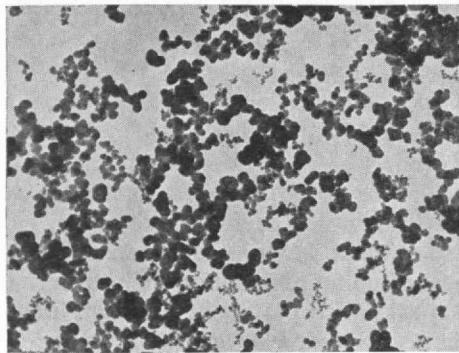
PREST-O-LITE Acetylene • PYROFAX Gas • NATIONAL Carbons • EVEREADY Flashlights and Batteries • ACHESON Electrodes

PRESTONE and TREK Anti-Freezes • ELECTROMET Alloys and Metals • HAYNES STELLITE Alloys



300,000,000,000,000,000

*particles in a
single ounce
of carbon black*



Carbon black is one of the most finely divided substances in all industry. It

is made up of particles so minute that it takes more than 300 quadrillion of them to make a single ounce of black.

This very property is responsible for its intense blackness in inks, lacquers, plastics, and, to a considerable extent, for its unique ability to reinforce rubber. As particle size decreases, blackness, surface area, adsorptive capacity, electrical conductivity and reinforcing ability all increase.

In Cabot Research Laboratories the particle size and surface area of all grades of Cabot carbon black have been evaluated by the electron microscope and adsorption methods. Such measurements have been invaluable in interpreting carbon black properties.

It has been found that while volatile matter, activity and other factors may modify surface properties, it is the total amount of surface area represented in a given weight of carbon black that is chiefly responsible for its behavior.

GODFREY L. CABOT, INC.

BOSTON, MASS.



*Top of page, sketched in part,
Nigrometer, which measures
blackness. Semi-reinforcing fur-
nace black, Sterling S, as photo-
graphed by the Electron Micro-
scope in the Cabot Research
Laboratories.*

**The NEW
Brown &
Sharpe**



The completely new line of Brown & Sharpe Micrometers offers an outstanding combination of advanced features. Greater durability and accuracy are provided by the exclusive, stainless steel, one-piece spindle and screw with hardened and ground threads. Easier, more accurate reading is made possible by the wide-spaced divisions, large-size thimble, black graduations, and dull chrome finish. Long-wearing carbide measuring faces assure enduring accuracy. See these new micrometers at your tool supplier's. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor

BROWN & SHARPE 

**ARTISAN
METAL PRODUCTS INC
EQUIPMENT FABRICATORS**
WALTHAM
MASS U.S.A.

THE HALLMARK
of
SUPERIOR
EQUIPMENT

Artisan engineers and workmen are skilled in the techniques of metal working. Their combined knowledge and experience in engineering and building special equipment and machinery have been of value to many leading mechanical and process industries.

Write for a copy of "Process Equipment". For a qualified engineer to call to discuss your equipment requirements, telephone Waltham 5-6800 or write to: — James Donovan, '28, General Manager.

AUTOCLAVES
CONDENSERS AND
HEAT EXCHANGERS
DISTILLATION
EQUIPMENT
EXPERIMENTAL
EQUIPMENT
EVAPORATORS
MIXERS
JACKETED KETTLES
PIPE, PIPE COILS,
AND BENDS
REACTORS
SPECIAL MACHINERY
TANKS

Artisan

METAL PRODUCTS, INC.

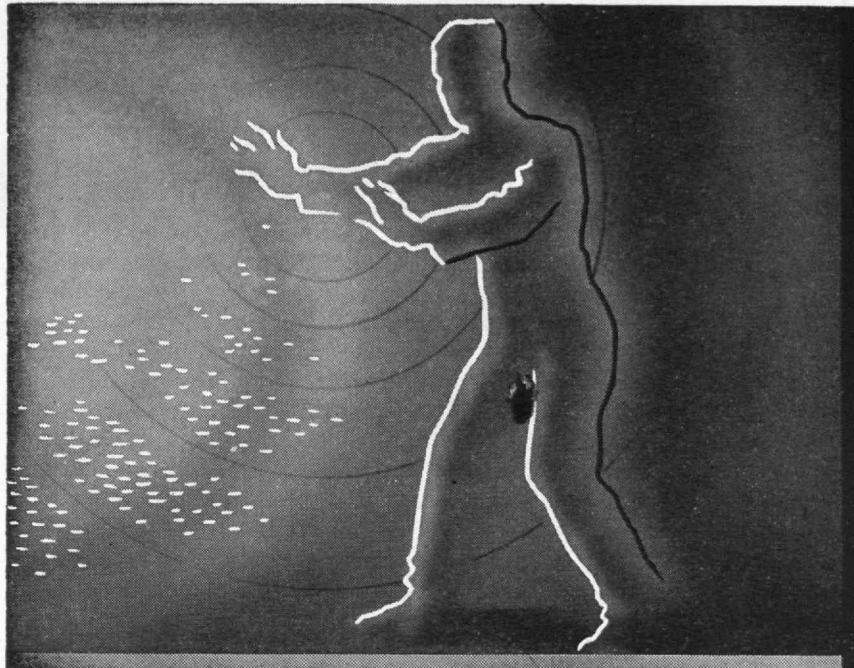
73 POND STREET, WALTHAM, (Boston 54) Mass.

THE TABULAR VIEW

Science in Administration. — Normally we do not expect administrators, as such, to make significant contributions to science or morality, nor do we assume that our religious leaders possess unusual competence in science or administration. Yet, not infrequently are scientists berated for failing to assume active administrative leadership in applying the fruits of science to the advancement of man's moral virtue. Perhaps the scientist should be flattered that his abilities are sometimes regarded as universal — if not superhuman. But those trained in science can hardly be expected to perform outstanding service in fields which, too often, require an unscientific temperament, as PROFESSOR PHILIP M. MORSE of the Department of Physics at M.I.T., points out (page 191). Dr. Morse holds that the same progress which has been achieved by operations research in the conduct of warfare (for which this comparatively new study was originally developed) can be expected to result when operations research is applied to the peacetime administration of industry. Professor Morse speaks with particular authority on this subject, for, as research director and deputy director of the Weapons Evaluation Group of the National Military Establishment in World War II, he was chief scientific authority for the agency conducting operations research for the Joint Chiefs of Staff and the Secretary of Defense. He was also one of the originators, and the first director, of the Brookhaven National Laboratory of the Atomic Energy Commission.

Success in Individuals. — In the upheaval of uncertainty which surrounds many a young person — and older ones as well — it is perhaps well to be reminded of the basic function of education in a democratic society. In "Education for Freedom" (page 195), PROFESSOR JOSEPH H. KEENAN, '22, of the Department of Mechanical Engineering, emphasizes the point that a requirement for self-government among men is a reasonably high degree of development of the intellectual and moral potentialities of the individual. Following his graduation from the Institute in 1922, Professor Keenan became engineer for the General Electric Company until 1928 when he became assistant professor of mechanical engineering at Stevens Institute of Technology. In 1934 he returned to M.I.T. as associate professor of mechanical engineering, and in 1939 was promoted to a full professorship. Professor Keenan has taken deep interest in international affairs, and, for the next term, will be on leave of absence under a Fulbright grant to study in England, as recorded in the November, 1950, issue of The Technology Review.

Safety in Automobiles. — A proper practical understanding of the forces, energies, and acceleration of moving vehicles will do much to reduce automobile accidents. Greater attention to design for safety and a willingness to forego some of the elements of sleek, fashionable appearance, will have a similar effect, (Concluded on page 182)



Blind man's buff

Blind man's buff is an expensive game to play with alloy steels. It is safer to go directly to the steel that will give the best performance at the lowest cost per finished part.

Molybdenum steels have shown time and again that they will provide consistently good properties at surprisingly low cost. Even their impact strength is consistent because they are not temper brittle.

Send for our comprehensive 400-page book, free; "MOLYBDENUM: STEELS, IRONS, ALLOYS."

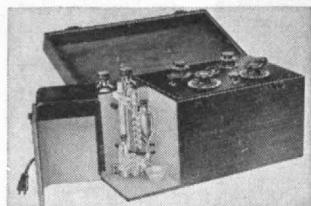
CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS

Climax Molybdenum Company
500 Fifth Avenue • New York City

MOLY

® C3

CAMBRIDGE electron-ray RESEARCH pH METER



RANGE AND ACCURACY: Sensitivity .005 pH; readings reproducible to .01 pH; accuracy .02 pH. Range 0 to 14 pH; 0 to 1200 m.v. **ELECTRON-RAY NULL INDICATOR:** Replacing the usual galvanometer, the electric eye provides quick and accurate null-point indication without possible damage to a delicate galvanometer. **NO BATTERY NUISANCE:** All-electric; plugs into any 110-volt AC Outlet. **ELECTRODE SYSTEM:** Sturdy glass electrode of condenser type is supplied. Micro condenser or dipping type glass electrodes can also be furnished. **COMPACT AND PORTABLE.** Laboratory and Industrial Models also available. Send for bulletin No. 910 MA.

LINDEMANN ELECTROMETER

3 1/4" x 2 3/8" x 1 1/8"
Weight 3 1/4 oz.

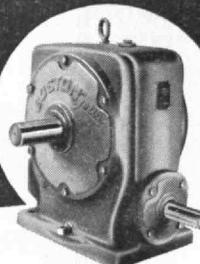


This instrument is extensively used for the determination of radio-active emission. Has high sensitivity, good stability and does not require leveling. Send for descriptive literature.

CAMBRIDGE INSTRUMENT CO., INC.
Pioneer Manufacturers of Precision Instruments
3707 Grand Central Terminal, New York 17, N.Y.

Right where you live

NEW BOSTON REDUCTORS



Speed Reducers stocked in the widest selection of types and sizes — and the one you want is *near at hand*, ready to take off the shelf of the one of eighty Authorized Boston Gear Distributors that is nearest you.

The new Boston Gear Catalog No. 55 makes it easy to select the one best Reductor (Speed Reducer) for your job. Write for free copy.

BOSTON *gear* REDUCTORS

For More Trouble-free { HORSEPOWER per Dollar
HOURS per Dollar



BOSTON GEAR WORKS
72 HAYWARD ST., QUINCY 71, MASS.

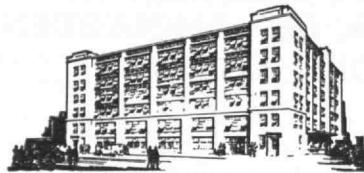
THE TABULAR VIEW

(Concluded from page 180)

even for those who have never been exposed to a course in the dynamics of rigid bodies. In fact, as DAVID O. WOODBURY, '21, reminds us (page 196), suitable co-operation between the public and automobile manufacturers, perhaps backed by a proper educational campaign, can do much to minimize casualties on the road. A graduate of the Institute's Course in Electrical Engineering, Mr. Woodbury has turned to literary channels and, since 1929 has been a free-lance interpreter of science. Something like a dozen books are to his credit, in addition to many magazine and newspaper articles on the significance of science and engineering.

Sojourn in Avesta. — Last summer five recent graduates of Technology had the unusual opportunity and good fortune to be selected to carry on engineering research in industrial plants and research organizations, all within a radius of approximately 100 miles of Avesta, in Sweden.

Based on reports written by Jacques A. F. Hill, '47, Richard M. Schotland, '48, and Robert N. Randall, '50, "Study in Sweden" (page 197) records the benefits of expanded horizons which are inevitably the result of rubbing elbows with colleagues in another country. Now back at M.I.T., Mr. Hill is continuing research in aeronautics at the Supersonic Wind Tunnel, and Mr. Schotland is engaged in research and advanced study in the Department of Meteorology. Mr. Randall's visit was extended to a full year, and he is still engaged in metallurgical research in Sweden. The reports from these three graduates come to The Review through the consideration of Norman D. Padelford who is professor of international relations in the M.I.T. Department of Economics and Social Science, and chairman of the Foreign Study Committee.



E. A. Laboratories (10 contracts since 1919)
Henry Manley, Engineer

180 of America's leading industrial companies have employed the W. J. Barney Corporation as builders — 104 of them repeatedly. Proof of satisfactory and low-cost building construction.

W. J. BARNEY CORPORATION

FOUNDED 1917
101 PARK AVENUE, NEW YORK
INDUSTRIAL CONSTRUCTION

Alfred T. Glassett, '20, President

The Bulk of the World's Production of Blood Plasma, Penicillin, Streptomycin

is made on National Research Equipment

**PRODUCERS
USING NATIONAL RESEARCH EQUIPMENT:**

Chas. Pfizer & Co., Inc.

E. R. Squibb & Sons

Sharp & Dohme, Inc.

Merck & Co., Inc.

Lederle Laboratories Div., American Cyanamid Company

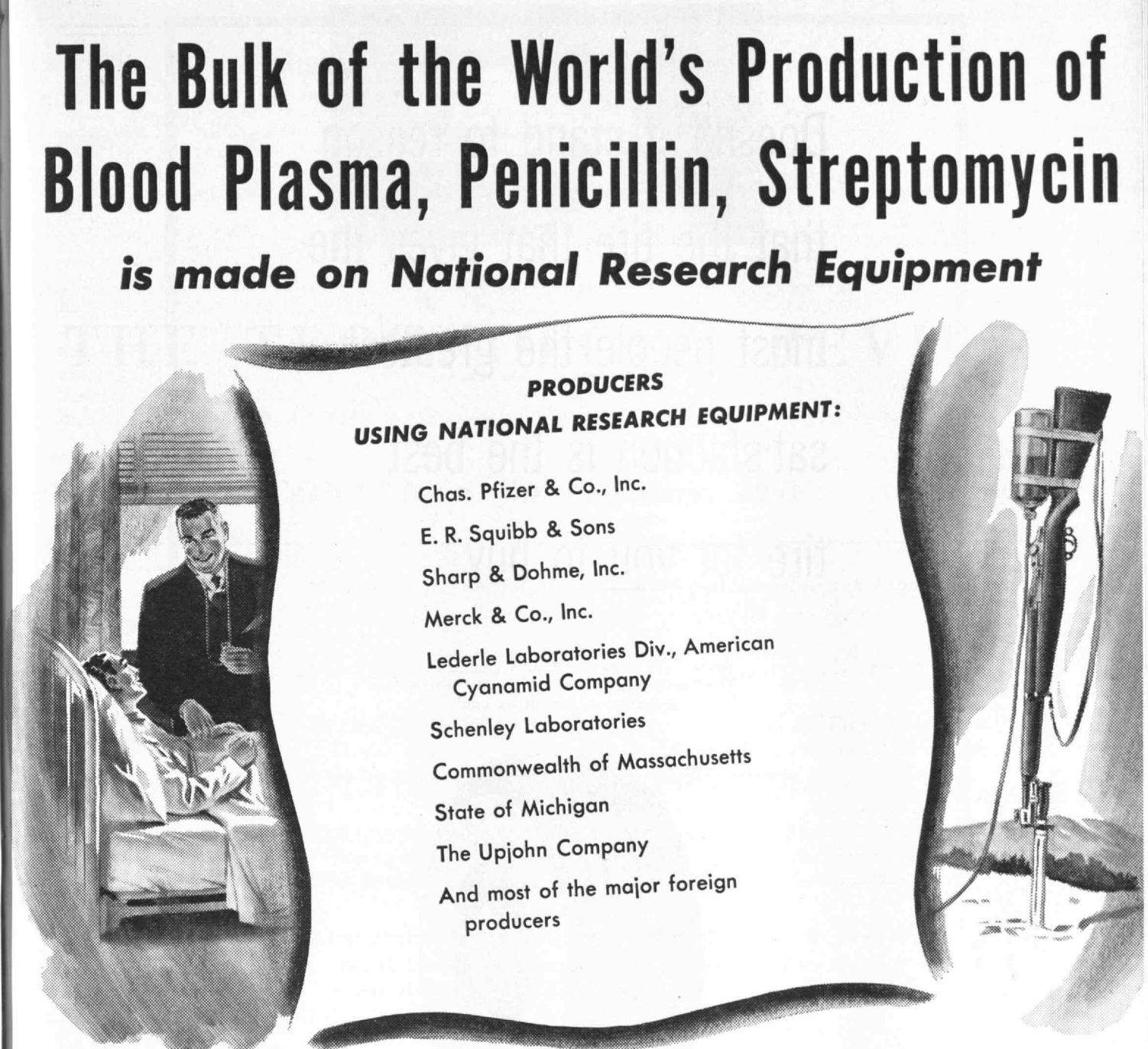
Schenley Laboratories

Commonwealth of Massachusetts

State of Michigan

The Upjohn Company

And most of the major foreign
producers



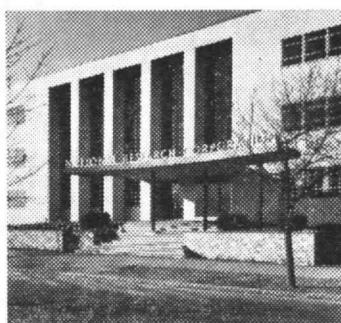
Laboratory rarities twenty years ago, today freeze dried antibiotics and blood plasma are readily available. With the completion of the new Sharp and Dohme blood plasma plant our vacuum dehydration equipment will have been used on practically the world's mass production of these life-saving products.

Our scientists and technicians take satisfaction in making this major contribution to the welfare of the world. National Research Corporation, 70 Memorial Drive, Cambridge.

National Research Corporation

Seventy Memorial Drive, Cambridge, Massachusetts

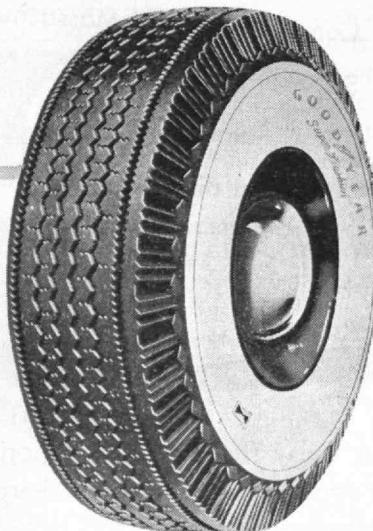
In the United Kingdom: BRITISH-AMERICAN RESEARCH, LTD., London S. W. 7 — Wishaw, Lanarkshire



Industrial Research • Process Development
High Vacuum Engineering and Equipment
Distillation • Coating • Metallurgy
Dehydration • Applied Physics

Doesn't it stand to reason
that the tire that gives the
most people the greatest
satisfaction is the best
tire for you to buy?

More people, you know, ride on *Goodyear*
tires than on any other kind.

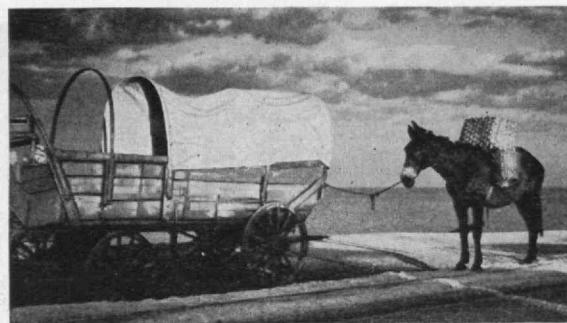


Super-cushion by

GOOD  **YEAR**

THE GREATEST NAME IN RUBBER

Super-Cushion, T.M.—The Goodyear Tire & Rubber Company, Akron, Ohio



Ward Allan Howe

Who mentioned politics?

THE TECHNOLOGY REVIEW

TITLE REGISTERED, U. S. PATENT OFFICE

EDITED AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

CONTENTS for February, 1951

VOL. 53, No. 4

SUBSONIC DIFFUSER (*Lewis Flight Propulsion Research Laboratory*)
Photograph by National Advisory Committee for Aeronautics THE COVER

ICE TREE · *Photograph by Robert H. Smyth FRONTISPICE* 186

OPERATIONS RESEARCH BY PHILIP M. MORSE 191
In war and in peace, scientists can assist administrators to make wise policy decisions by analyzing systems and operations

EDUCATION FOR FREEDOM BY JOSEPH H. KEENAN 195
Development, in high degree, of potentialities of the individual is prerequisite for a government of free men

AUTOMOBILE SAFETY BY DAVID O. WOODBURY 196
Straightforward application of the laws of mechanics to safety in automobile design seen as reducing accident casualties

Editor: B. DUDLEY

Business Manager: R. T. JOPE

Circulation Manager: D. P. SEVERANCE

Editorial Associates: PAUL COHEN; J. R. KILLIAN, JR.; WILLY LEY; F. W. NORDSIEK; J. J. ROWLANDS; D. O. WOODBURY

Editorial Staff: RUTH KING; RUTH A. PHILLIPS

Business Staff: EILEEN E. KLIMOWICZ; MADELINE R. MCCORMICK

Publisher: H. E. LOBDELL

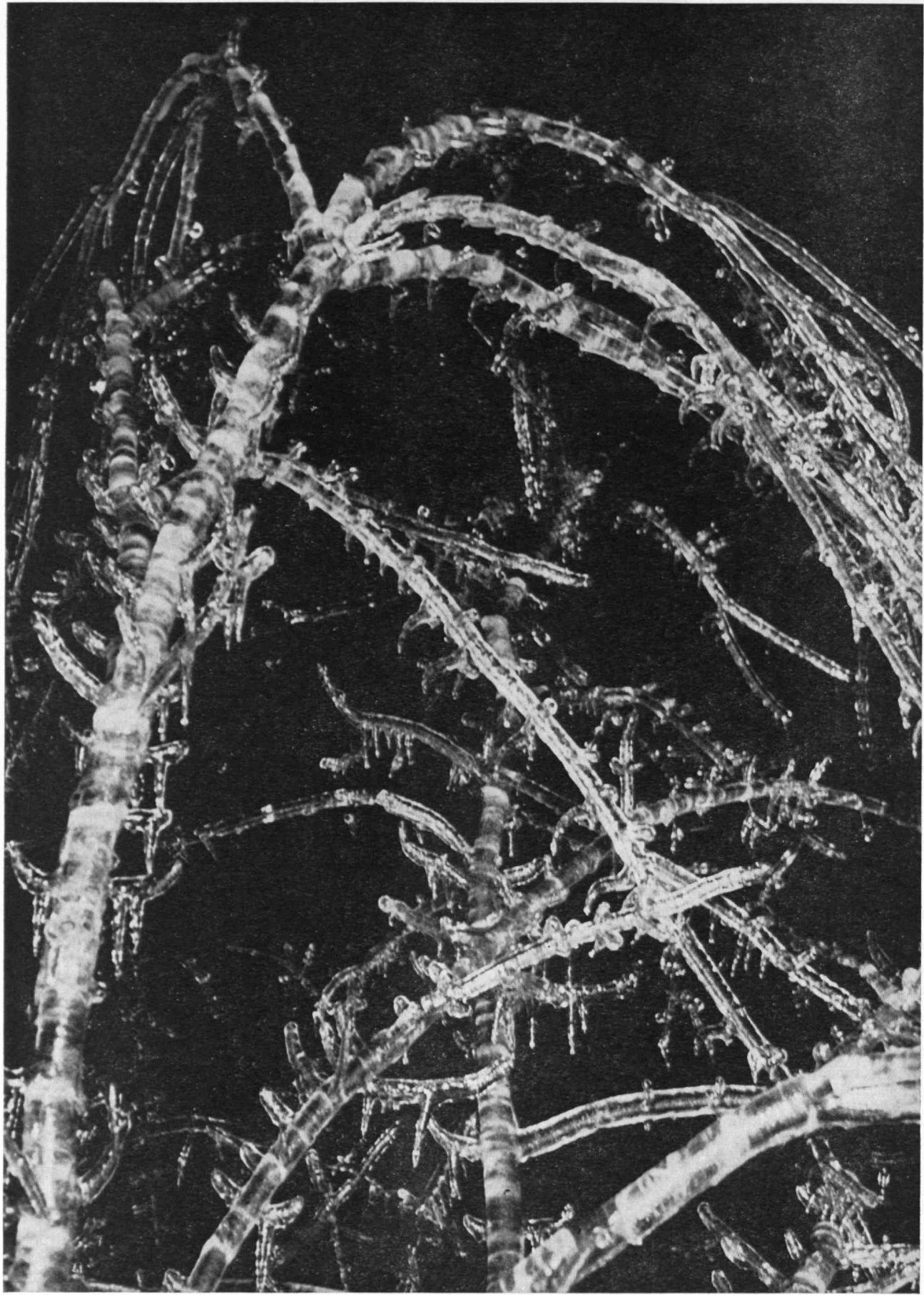
STUDY IN SWEDEN BY JACQUES A. F. HILL, ROBERT N. RANDALL, AND RICHARD M. SCHOTLAND 197
Taking advantage of opportunity to do research abroad, five Technology graduates find much to admire in Sweden

THE TABULAR VIEW · *Contributors and Contributions* 180

THE TREND OF AFFAIRS · *News of Science and Engineering* 187

THE INSTITUTE GAZETTE · *Relating to the Massachusetts Institute of Technology* 203

Published monthly from November to July inclusive on the twenty-seventh of the month preceding the date of issue, at 50 cents a copy. Annual subscription, \$3.50; Canadian and foreign subscription, \$4.00. Published for the Alumni Association of the M.I.T.: John A. Lunn, President; H. E. Lobdell, Executive Vice-president; Horatio L. Bond, Allen Latham, Jr., Vice-presidents; Donald P. Severance, Secretary-Treasurer. Published at Hildreth Press, Inc., Bristol, Conn. Editorial Office, Room 1-281, Massachusetts Institute of Technology, Cambridge 39, Mass. Entered as second-class mail matter at the Post Office at Bristol, Conn. Copyright, 1951, by the Alumni Association of the Massachusetts Institute of Technology. Three weeks must be allowed to effect change of address, for which both old and new addresses should be given.



Robert H. Smyth, '28

Ice Tree

THE TECHNOLOGY REVIEW

Vol. 53, No. 4



February, 1951

The Trend of Affairs

Imitating Nature

EMIL FISCHER, the pioneer organic chemist (1852-1919), said that his two paramount ambitions were to make a lump of sugar and to lay an egg. Thus he neatly epitomized the difficulties faced by chemists seeking to assemble, in the laboratory, the complex molecules of naturally occurring substances. Fischer approached achievement of the first of his two aspirations, as he did succeed in synthesizing a number of sugars. If he were alive today, he would have witnessed total accomplishment of the first of his goals, as sucrose (the sugar that is made in lumps and found in sugar bowls) has now been made synthetically.

In the making of an egg, Fischer could scarcely have aspired to generating the spark of life that resides in the egg. In reproducing the chemical ingredients of an egg, Fischer progressed part of the way toward the making of proteins. For he made peptides (protein building blocks that in size fall between the elementary amino acids and the complete complex protein molecules) that closely simulated the natural substances. The protein molecule, as found in nature, has not been synthesized even today, despite the great strides in synthetic organic chemistry since Fischer's time.

The single fact that the protein molecule has not been synthesized provides one useful index of the current status of the synthetic reproduction of biological substances. Thus, none of the enzymes can yet be made synthetically, as enzymes are protein in constitution. Hormones of a protein nature, such as insulin, have not been synthesized; whereas sex hormones, which are steroids, are now made synthetically. Vitamins are not protein in constitution; and with the exception of vitamin D most of the vitamins have been successfully synthesized. In this connection it is noteworthy that vitamin A, the predominant vitamin of Fischer's egg, has been synthesized in recent years

and has now reached the phase of large-scale commercial production.

The synthetic reproduction of complex natural molecules has profound importance, both academic and practical. At the outset, such synthesis is necessary to establish categorically molecular constitution and arrangement. Furthermore, synthesis is an indispensable preliminary step in metabolism studies using tracer elements. In such studies, compounds are tagged, or labeled, by introducing heavy or radioactive elements into their molecule. Then such tagged compounds are fed or otherwise administered to experimental animals, and the metabolic fate of the compound within the animal is followed by analyzing tissues, secretions, or excretions for the presence of the tagged element. It has not been possible to introduce tagged elements into the molecules of natural substances; instead, labeled compounds have been made only through synthesis, using the tagged element where it fits into the molecule.

Finally, the synthesis of useful natural compounds is a prime practical objective because in this way abundant production in pure form, and at relatively low cost, is made possible. The vast quantity of synthetic vitamins manufactured today is but one example of this point. In view of these exigencies, continued progress in the synthetic reproduction of complex natural molecules is as diligently pursued by present-day organic chemists as it was earlier by Emil Fischer.

Speed to Burn

At low velocities, the surface temperature of objects moving through the air is not noticeably increased. But at sea level, the temperature of a wing surface may rise 100 degrees F. for speeds of 500 miles per hour; whereas the temperature increase may be something like 3,000 degrees F. for speeds of 5,000

miles per hour. Very high speed projectiles may, therefore, easily acquire speeds to burn — or melt — and must be designed to take account of high temperatures and high-temperature gradients. It becomes clear that before very high speed flight can be accomplished, we must know more about the physical conditions to be encountered by missiles.

A study to determine some of the thermal and stress conditions encountered in high-speed flight has been completed at M.I.T. as a joint undertaking of the Department of Aeronautical Engineering, under the supervision of Professor Joseph S. Newell, '19, and Professor Hsue-Shen Tsien, '36, former member of the Department, and of the Department of Mechanical Engineering, under the direction of Joseph Kaye, '34, Associate Professor of Mechanical Engineering, and Warren M. Rohsenow, Assistant Professor of Mechanical Engineering. The work, which was performed for the United States Air Force, was undertaken to determine what happens to a thin, wedge-shaped wing moving at high supersonic speeds — corresponding to Mach numbers between 1 and 6, or speeds between approximately 740 and 4,450 miles per hour.

The results obtained in the solution of this particular problem may be summarized as follows:

1. The most severe temperature rise will occur at the leading and trailing edges of the wedge-shaped wing. In fact, when the wing attains a Mach number of 6, the temperature of the leading and trailing edges is just slightly below the melting point of steel, namely, 2,300 degrees F. The temperature rise of points located along the chord of this wing will have risen to only about 100 degrees above the initial value when the Mach number of 6 is first reached.

2. At the time the Mach number of 6 is first reached, the temperature along the four surfaces of the wedge-shaped wing will decrease from 2,300 degrees F. at the leading edge to about 700 degrees F. at the center of the wing; it will then rise along the aft portion of the wing, reaching a value of 2,300 degrees F. at the trailing edge.

3. The temperature gradients along the vertical planes in the wing will be exceedingly large, of the order of 2,000 to 10,000 degrees F. per foot. On the other hand, the temperature gradient along horizontal planes in the wing, parallel to the chord, will be considerably smaller, of the order of 200 degrees to 2,000 degrees F. per foot.

4. The presence of these large inequalities of temperature in the wing structure will give rise to large thermal stresses. In fact, calculations based on elastic theory show that the maximum stress could reach a value of 400,000 pounds per square inch, if the material remained in the elastic region.

This study has shown that a large amount of experimental work must be carried out in the field of supersonic heat transfer before one can safely design a device to fly for long periods at speeds greater than 1,400 miles per hour. The study also indicates the range of thermal stresses, temperatures, temperature gradients, and secondary aerodynamic stresses which may be encountered in any experimental study and thereby indicates the laboratory facilities required for a further continuation of this important work on an experimental basis.

From Theory to Practice

NOISE of such magnitude as to have serious effect on fundamental research at the Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics at Cleveland, has been housed, harnessed, and cut down to a whisper. The transition from stentorian stampede to soothing silence was accomplished with an important contribution from an M.I.T. doctoral thesis on acoustic theory.

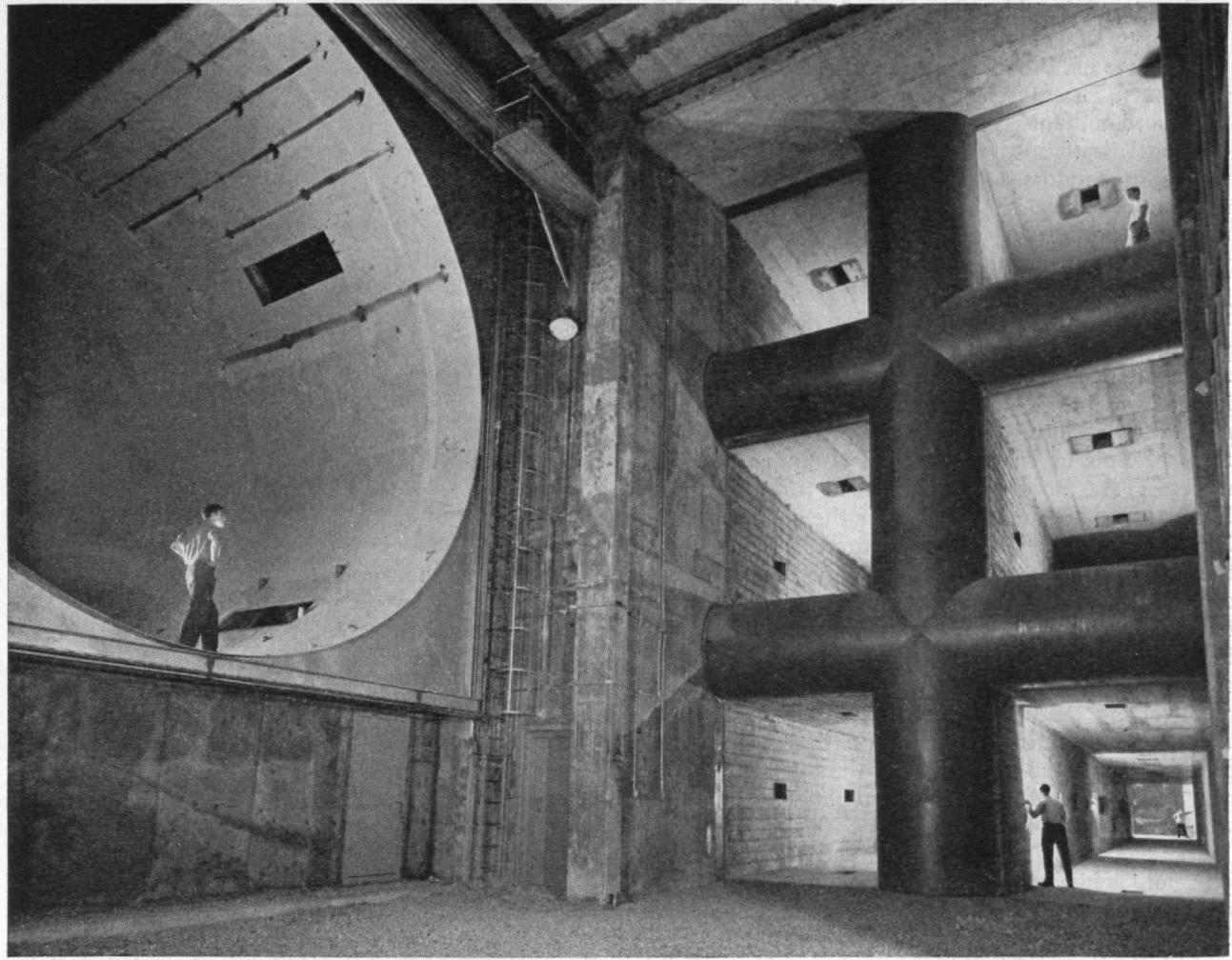
When a ram-jet engine was put through test runs at supersonic speed conditions in the eight- by six-foot supersonic wind tunnel, tremendous disturbances in the extremely low-frequency ranges were generated. These came from energy generated by the wind tunnel's 87,000-horsepower compressor, which sent shock waves and enormous quantities of turbulent air pounding against the tunnel walls and from combustion noise from the burning ram-jet operating in the tunnel test section. The acoustic treatment of the supersonic wind tunnel was originally designed on the basis of the best acoustical information then available, but the data did not prove adequate to muffle the noise which developed when ram-jet engines were put on test.

The conditions created in the tunnel caused a sound output of extremely high intensity, in the range of from five to 100 cycles per second. The lower range of such frequencies produces pressure waves through the atmosphere which cannot be heard by the human ear but are of such intensity as to vibrate the walls of structures at considerable distances, sufficient to rattle windows, doors, and dishes.

Conventional types of acoustical treatment do not absorb sounds of such low frequencies, although they are effective in attenuating the human voice, office noises, and similar sounds for which most of the energy occurs at frequencies of a few hundred cycles per second. Obviously, special acoustical designs were needed to dissipate the very low-frequency sound, and to provide adequate control of the noise contemplated in a wide range of research projects.

The problem was solved by a consulting group headed by M.I.T. staff members Richard H. Bolt and Leo L. Beranek, director and technical director, respectively, of the Acoustics Laboratory, Robert B. Newman, '49, and Samuel Labate, '48. A new type of tuned absorptive duct was proposed by Professor Beranek, based on a theory contributed by Professor Philip M. Morse, of the Department of Physics, a few years ago. But no theory was available for engineering at the very lowest frequencies. At this point, the new knowledge applicable to this problem, and developed in the Acoustics Laboratory in connection with the doctoral thesis of K. Uno Ingård, '50, was put to use. The new results made it possible, for the first time, to calculate noise-reducing properties of acoustic resonators accurately at very low frequencies.

To attenuate noise of the lower frequencies, new construction was required, consisting of a series of properly designed resonators, both inside the existing concrete housing of the 230-foot long, trumpetlike, subsonic diffuser, and also in the planned addition to the acoustical house. Concrete partitions were built at five stations inside the diffuser housing. By taking into



National Advisory Committee for Aeronautics

Intake end, showing six passages and arrangement of the Helmholtz resonators for the attenuation of noise, particularly of very low frequency, at the supersonic wind tunnel of the Lewis Flight Propulsion Laboratory in Cleveland. The discharge end of the subsonic diffuser is at the left.

consideration the diameter of the diffuser in each of the chambers, it was possible to cut slots in the diffuser at each station, of such size as to match the air volume of each chamber, thus producing a resonator to attenuate effectively within its design frequency range. The research studies and tests which were made had previously indicated that it was feasible to attenuate the lower frequencies first, dissipating the higher frequencies as progress was made downstream.

The illustration on the cover of this issue shows an upstream view from the discharge end of the subsonic diffuser, with placement of Helmholtz resonator parts for the frequency range of from five to 11 cycles.

Fluorine Chemistry

At present, a small segment of the chemical industry, that branch of chemistry dealing with compounds of fluorine, may soon be destined, through rapid expansion, to play a significant role in chemical manufacturing. The possibility of applying inert, stable fluorides in industry in such widely different applications as lubrication, refrigeration, and high-voltage electrical insulation, is one underlying reason for this anticipated growth. Another is that recent progress in fluorine chemistry has disclosed methods

of safely transporting reactive compounds of fluorine — a highly active gas in the elementary state — which may be used in place of the element, thereby stimulating and reducing the cost of research in chemistry.

Such, at least, are some of the possibilities which are being studied in the Department of Chemistry at M.I.T. by a research group working under the direction of Professor Walter C. Schumb, of the Department.

The remarkable group of compounds of carbon and fluorine comprising the fluorocarbons, for example, possess the valuable properties of resistance to powerful oxidizing agents, physical stability at high temperatures, and lack of inflammability, making them valuable for such purposes as lubrication under high-temperature conditions and other similar critical applications. Aside from the desirable properties enumerated above, the fluorocarbons have physical properties otherwise resembling those of the hydrocarbons, which they could replace in certain chemical reactions. Up to the present, the fluorocarbons have been expensive, directly or indirectly requiring elementary fluorine for their preparation; and, since not produced on a relatively large scale, they were not extensively used. But efforts are being made to produce such compounds at reasonable costs on a commercial scale.

Certain of the chlorofluorides of carbon, including the group of compounds familiarly known by the trade name of "Freon," have long been utilized as refrigerants. The most common of this group, dichlorodifluoromethane (CCl_2F_2), has also been used as an electrical insulating gas in such equipment as high-voltage generators. Other volatile fluorides, notably sulphur hexafluoride (SF_6), have been employed for the same purpose. Under most conditions, this compound is a remarkably inert, nitrogenlike gas, and is probably the best known gaseous high-voltage insulator. Its use in high-voltage apparatus, such as x-ray generators, where its insulating properties are most appreciated, is accompanied by some decomposition into lower fluorides of sulphur and elementary fluorine, with resulting danger of corrosive attack on the materials of which electrical equipment is constructed. The program of inorganic research in the Department of Chemistry, under the supervision of Professor Schumb, is directed toward establishing first, the exact composition and nature of the lower fluorides of sulphur, some of which have not been definitely established; and second, the possibility of reconditioning the gas while in use, either by absorption of the contaminating decomposition products, or possibly by reconverting these decomposition products back to the stable sulphur hexafluoride. If this program should prove feasible, the utilization of the otherwise superior insulating properties of sulphur hexafluoride would be greatly facilitated.

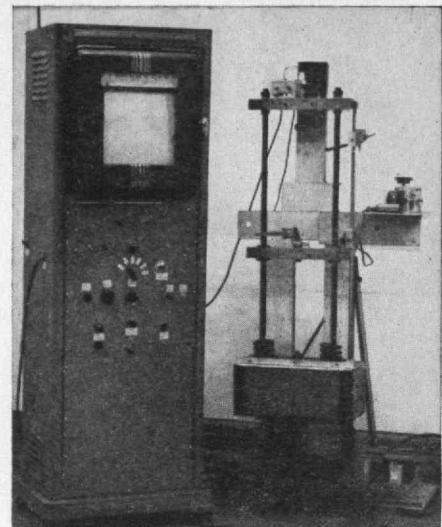
The synthesis of fluorocarbons and other fluorides is usually achieved by the use of elementary fluorine, which is highly reactive and noxious. Attention has been given, therefore, to improved methods of preparing, storing, and handling fluorine gas, especially under pressure. Relatively small cylinders of this highly reactive compressed gas are commercially available, but are expensive and require careful handling with adequate safety precautions. Study of fluorine chemistry gives ample indication that, for many purposes, certain of the halogen fluorides can be used as fluorine substitutes for research and manufacturing, and such compounds can be transported more safely and inexpensively.

Along somewhat more academic lines, the preparation and study of various other metal and nonmetal fluorides has been proceeding, together with the establishment of the structures of such compounds by infrared and Raman spectroscopic methods. Richard C. Lord, Associate Professor of Chemistry and Director of the Institute's Spectroscopy Laboratory, has collaborated in the determination of these structures.

Suit Yourself

An important new type of servocontrolled testing machine for the precise measurement of stress and deformation in plastics, as well as in fibers, yarns, and fabrics, is in operation at the Institute's Samuel Slater Memorial Research Laboratory. Better suits and other clothing may be expected to emerge through the use of the new tester, since the forces acting on the fibers under test are measured and recorded by means of electronic circuits; and effects of friction, inertia, and momentum are eliminated in the measurement.

The M.I.T. servocontrolled testing machine, with recorder shown at the left. The transducer load cell is near top of right-hand rack, and servocontrol mechanism is at center. The machine is used for studying fiber properties not previously investigated for lack of suitable equipment.



The tester can be operated at a constant rate of load application, a constant rate of deformation, or in any combination of ways, both for simple tension or compression tests, and for cyclic operation. According to Professor Edward R. Schwarz, '21, who is in charge of Textile Technology at the Institute, the testing machine makes possible the measurement of forces with or without accompanying deformation, and results are completely free from the characteristics of the test and measuring unit.

The testing machine represents the most important single development in the field of textile experimentation in recent years. For the first time, it is possible to determine certain important fundamental properties of natural and synthetic fibers. A knowledge of the properties of fibers opens the way for the production of new textile materials; it also paves the way for more intelligent use of existing fabrics by blending of fibers to meet prescribed characteristics. Thus, the way is opened for the textile scientist to engineer fabrics to meet specified requirements — a feat which has never before been possible in textiles, except in exceedingly limited degree.

Important results are expected to come from the use of the textile testing device, which was developed to promote and advance the effectiveness of instruction and research at M.I.T. For example, when a specimen is allowed to recover partially after some load (short of that needed to produce failure) has been applied, and the resulting deformation is then maintained constant, the load increases for a certain length of time in a manner characteristic of the material and its past history. This phenomenon has not been studied in the past, but is now the subject of research using the servocontrolled tester.

The present model of the testing machine uses a new form of energy converter, or transducer, developed by Kurt S. Lion, Associate Professor of Applied Biophysics. Contributions to the development of the machine have also been made by the Servomechanisms Laboratory under the direction of Professor Gordon S. Brown, '31, and by the Plastics Research Laboratory staff under the direction of Professor Albert G. H. Dietz, '32, of the Department of Building Engineering and Construction at Technology.

Operations Research

*Science Cannot Take Over the Task of Administration,
but Policy Decisions Can Be Made More Wisely by Scientific
Study of Administrative Problems through Operations Research*

By PHILIP M. MORSE

OME of the most interesting new developments in applied science encompass the study of human activity rather than of the physical sciences. One sees instances of this in many research projects already in progress at M.I.T.; further confirmation of the trend is indicated in the recent establishment of the School of Industrial Management. Utilizing these new developments, in addition to the many traditional tools of science, the burgeoning field of operations research has as its goal the direct study of administrative problems. The aim is not to supplant the administrator, but to help him make his decisions more wisely and effectively.

Operations research began during World War II; its early successes were chiefly in the field of military operations where it is still of utmost importance. Since the war, it has been applied in business and industry, and is well on its way to becoming a recognized field of applied science. A professional society serving the new field has been established in England; in the United States, the National Research Council has a Committee on Operations Research; a graduate course in the subject has been offered at M.I.T. for the last two years.

At present, the chief handicap to its further development is the great shortage of trained men. In the present emergency, the military services alone could use many times the number now available; and there is industry's interest in persons with training in operations research. The Institute is aware of these needs and is contributing in many ways to meet the demand. In addition to the course offered, it serves the Navy. The official Navy operations research group is called the Operations Evaluation Group. It is a team of civilian scientists headed by Jacinto Steinhardt, housed in The Pentagon as a part of the staff of the Chief of Naval Operations, supplied by M.I.T. on a contract through the Division of Industrial Coöperation. Beyond this, a number of research projects being conducted at the Institute are providing new tools for application to operations research.

One of these projects, for example, concerns the theory of communication, which is being studied intensively in the M.I.T. Department of Electrical Engineering. The immediate practical applications, in the field of electrical communication, are interesting enough. But they are trivial compared to the possibilities for future application; as, for example, in the field of language. How much redundancy must there be in

a language in order that the meaning to be imparted will survive lapses in attention of the listener? A radar operator sees the screen he is supposed to be watching less than half the time, according to wartime data; all of us must really receive but a fraction of the words we hear or read. Things must be said twice and three times to have a good chance of transmission from mind to mind. Natural languages have this necessary redundancy built into them. If we should ever need to devise a universal language for a single world, considerations of this sort will be quite necessary, and communication theory should play a central role in the design stages.

The experiments of Alexander Bavelas, '48, Associate Professor of Psychology at Technology, on the transmission of ideas and orders in task-oriented groups point the way to other applications of communications theory. Professor Bavelas restricts the channels of communication between members of the group to some specified pattern, and then observes group action as the members try to solve some co-operative task. Some of the action, the nature and number of the person-to-person messages sent, the emergence of leadership in the group, and the frequency of failures, for example, show a definite correlation with the nature of the prescribed communication net. As yet, the experiments have not developed to a stage where any but the most rudimentary analysis is required, but a combination of communication theory and topology will probably be needed to unravel further extension of the work to larger groups or more complex tasks. The implications of such studies with regard to our understanding of social dynamics are, of course, great.

Another field of mathematics which is pointed to human affairs is the theory of games, recently developed by John Von Neumann at the Institute for Advanced Study, Princeton, N.J. Here is the beginning of a quantitative analysis of competition, of bluff and counterbluff, which is a part of war and business, as well as poker. Thus far, the serious applications of the theory have been in military studies, but some applications to business dynamics are now under way.

Most of these newly developed mathematical tools, and many other more familiar ones, are being used intensively in operations research. This field of application of science takes, as its subject of study, the operations of an organization. Whereas the civil engineer uses mathematics and physics in designing or strengthening a bridge, the operations research

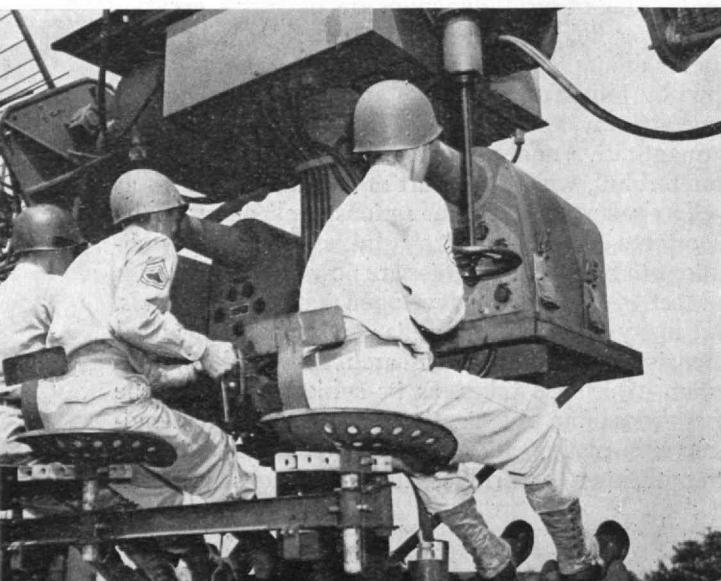
worker uses mathematics and other sciences to study and improve the interactions in an organization of men and equipment while it is performing some co-operative task. The civil engineer reports to, and works closely with, the builder of the bridge; the operations research worker reports to, and works closely with, the administrator, the executive officer in charge of the operation.

Operations research has been defined as "a scientific method of providing executive departments with a quantitative basis for decisions regarding operations under their control." Some of its techniques have been used sporadically in industrial and military problems earlier; but its inception, as a recognized and organized activity amenable of application to a variety of problems, occurred at the beginning of World War II. Its value is well recognized in military organizations, and each branch of our services now has its own operations research group as part of its staff. Since the war, an increasing number of applications have been made in business and industry where its value has also been amply demonstrated.

Perhaps a more philosophical definition might also be attempted. Science and the scientific method have often been criticized for making possible the production of machines and weapons and then failing to show how these products are wisely or effectively used. In a rather fundamental sense, however, this criticism involves a contradiction in terms. Science and scientific techniques are not designed to make decisions or to carry on the basic operations of administration, such as running an army or a business. They have been designed to increase our understanding about some facet of nature; and while this increased understanding will make the task of some administrator wider in scope, or will enable him to make his decisions more wisely, or will reveal to him more fully the consequences of his decisions, it seldom will make the decision for him. The administrative decisions concerning the use of the products of science should be based on all the data available, but they nearly always involve other factors of politics, morale, or personalities, which are non-

In radar, and radar countermeasure, sometimes the too early application of a countermeasure is as harmful as one too late. Reports must be properly evaluated to decide on an action which will be truly effective.

International News Photo



scientific and which must be decided in an arbitrary sort of way. In many cases, it is more important *that* a decision be made than *how* it is made, which, of course, represents a thoroughly unscientific attitude.

Science Is Not Administration

But, if science cannot and should not take over the task of administering the use of the equipment it makes possible, it can nevertheless assist in an important way in the running of the operations of civilization — in the use of the equipment it helped create. It can provide this assistance only by being itself; by studying operations and understanding them quantitatively and impersonally, rather than by administering them. Here the subject for study is the operation itself: the traffic on a highway, the operation of strategic bombing, the routing of busses or freight cars, or the tactics of sinking a submarine. Just as physical and chemical nature is studied to provide facts which may be used to build an aircraft, so the operations of strategic bombing have uniformities and trends which, when understood, may be used to improve operations and to redesign them under changing circumstances. Here, again, the scientist does not usurp the job of the administrator who is running the operation. He seeks to understand the operation more clearly so that his clearer picture, when transmitted to the executive, will enable this officer to make his decisions more wisely and effectively.

It will be objected that the scientific study of the operations of civilization is the task of the social scientists, and that physical scientists should stick to their lasts, turning out more gadgets. This objection was successfully refuted during the last war by the experience of the operations research groups working with the various branches of the services. These mixed groups included mathematicians and physical and biological scientists, as well as social scientists (and even lawyers!); they studied various operations of war in a scientific manner, in close collaboration with the operations officer responsible for making the decisions concerning the operation. The groups worked out a quantitative picture of the tactics of sinking a submarine, for example, or of bombing a city; showed how the results depended on the equipment involved and on the way the equipment was used; and presented this picture to the operations officer so he could issue his orders wisely and use his forces as effectively as possible. These groups worked out a possible symbiosis of scientist and administrator which, evidently, has very great possibilities for further uses in other less destructive aspects of the operations of civilization.

It was found that physical scientists and mathematicians were at least as necessary, for an effective group, as were the social scientists. Nearly all the operations studied had aspects which were familiar to the physical scientist and which he was trained to analyze. The biologist and psychologist were necessary, of course; but most groups were not effective without representation from all the scientific disciplines. The writer is convinced that many aspects of economics and other social sciences will not advance appreciably until they are subjected to the techniques familiar to the physical scientist.

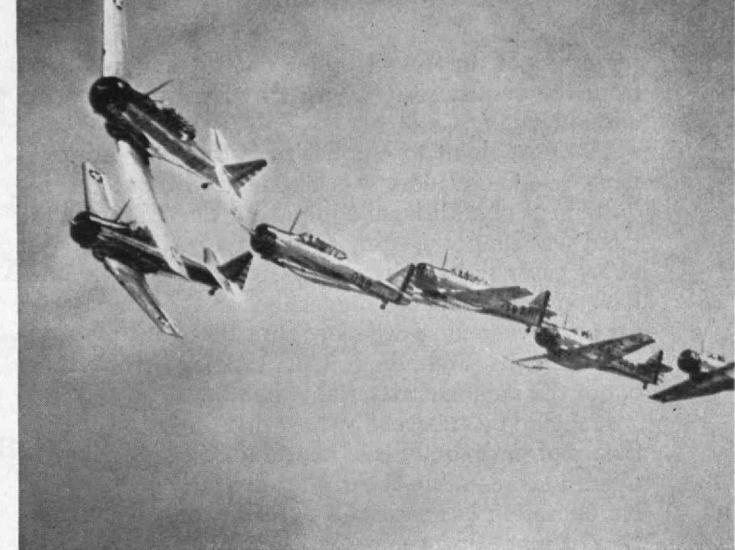
It should be emphasized again that operations research is not merely statistics, efficiency engineering, or market analysis. For one thing, it utilizes the technique so successful in physics and other sciences, of the interplay between tentative theory and experimental test — of a trial conceptual model and a systematic testing of its consequences. In a recent study of a nationwide sales problem, it was necessary to set up a mathematical model of the customer — not just the average customer, but of all customers with all their variability and their tendencies to change from year to year — before a satisfactory theory could be devised and the problem solved. Detailed mathematical analysis showed that a relatively few sampling runs would be needed to obtain the important parameters, and that the earlier market surveys, despite their complexity and detail, had failed to measure some of the most important quantities. Once these parameters were obtained, it was possible to answer such questions as: Should additional sales effort be spent trying to sell the best customers more, trying to win back past customers, or trying to capture new markets? Only by the use of conceptual models of an operation, checked by experiment, can questions of such nature be answered; mere correlation of data, blindly taken, cannot suffice.

Such an active point of view toward the material under study is the difference between the scientist and the historian. The operations research worker wants to understand operations so that they can be predicted and thus influenced. Sometimes the prediction and the understanding go hand in hand; one makes a tentative prediction and if it works out, the hypothesis is verified. A few examples will make this clearer than further generalities. The first example concerns the problem of understanding the interrelations between operational training, bombing accuracy and bomber effectiveness while conducting the strategic bombing of Japan.

Examples of Operations Research at Work

Certainly all the crews, which manned the B-29's used to bomb Japan, came to the operational base at Saipan with a great deal of prior training in bombing. One would suppose that, once they were on Saipan, they should spend all available flying time actually doing their job of bombing Japanese cities. It would seem, at first sight, inefficient for them to waste valuable time and gasoline doing any further practice when the real job was there to do. Nevertheless, the results of the early B-29 raids on Japan were far from satisfactory. Errors of aim were large enough so that, on the average, less than 20 per cent of the bombs fell within 1,000 feet of their target. Surely this record needed improving, and a great deal of discussion went on in the command as to what should be done. Undoubtedly a new bombsight of greater complexity would improve the results, but this would cost a great deal in time and money, both to manufacture and to install in the airplanes.

The operations research worker, with the command, suggested that additional scored exercises might improve the results. After some hesitation it was decided to try this for a month or so; it might not



The operational accuracy of bombing more than doubled, during a trial period of one month in World War II, by devoting 20 per cent of flying time to carefully scored practice bombing, and 80 per cent to actual bombing of the enemy.

help, but no other immediate action suggested itself. Accordingly, it was ordered that 20 per cent of the flying time of operational crews for a month be devoted to carefully scored practice bombing under simulated operational conditions, and that only 80 per cent of the time was to be spent on bombing Japan. The results were successful beyond anyone's expectation. Within the month the operational accuracy of bombing had more than doubled; and by the end of two months, more than half of the bombs dropped on Japan landed within 1,000 feet of their target. By devoting 20 per cent of the time of crew and airplane to operational training, the precision of bombing for the remaining 80 per cent was increased more than two and one-half times. Thus the over-all effectiveness of the bombing was more than doubled. This was enough improvement so that the installation of new bombsights was not required.

This example shows several of the characteristics of operations research. In the first place, the worker was a part of the staff, working with the operations officer. In addition to carrying out the statistical analyses to measure effectiveness, his contribution was to supply a certain experimental-mindedness characteristic of the scientist. Essentially, he said: "If my picture of the relation between training and accuracy is correct, then operational training will help. Let's try it and see." In many cases, of course, such experiments cannot be tried, and it is the duty of the officer to make the ultimate decision. For effective teamwork, the operations officer must realize that the operations research worker does not suggest such experiments out of idle curiosity, and the research worker must realize that the officer does not veto his suggestion (if he does) out of pure conservatism.

In the second place, this example shows the importance of continual measurement of the effectiveness of an operation and the use of the operations research worker in evaluating these measurements incessantly. In this case, a considerable amount of statistical analysis was necessary to separate various other effects (as,

for example, improved cruise control and weather) from the results so as to assess the actual effect of added training.

The next point to emphasize is that the improvement in effectiveness was obtained without the requirement of additional equipment; the equipment at hand was simply used more effectively. Of course, in many cases the results of the study of an operation have yielded valuable suggestions to the laboratories for improvement of weapons, but these are by-products of the research; the primary task is to get the most out of the men and material at hand.

It should be apparent by now that the mathematical theory of probability is of considerable importance in operations research. It turns up in nearly every study. No operation has a certain outcome, only a distribution of more or less probable outcomes. No one can evaluate operations without understanding probabilities. To evaluate strategic bombing, for instance, one must know the mean rate of aircraft aborts, the probable error of navigation of the usual crew, the probability of radar detection and of enemy fighter interception, the mean vulnerability of both fighter and bomber to damage by gunfire, the accuracy of antiaircraft fire, the probable error of bombing, and the expected damage function of the bomb — every item of which must be expressed in terms of probability. In many cases it is not sufficient to have an average value. One must know the spread of values: whether there are likely to be twice as many aircraft aborts, on a particular day, as on the average, or the chance of a bomb falling within 100 feet of the target when the probable error is 1,000 feet.

Importance of Quantitative Evaluations

In the cutthroat game of radar and radar countermeasure, it often happens that a countermove too early is at least as harmful as one too late. How is one to evaluate reports in order to decide what to do and when to do it? In 1944 our submarines in the Pacific were supplied with aircraft warning radar to help them escape detection by Japanese aircraft. After a few patrols, it was discovered that many submarine skippers did not use the set. More airplanes came in when they had it on, they said; the Japanese must have a set in their airplanes which picks up the radar and homes on it. An examination of patrol reports showed that the skippers were indeed correct in their facts; those submarines having radar on, reported rather more than three times as many airplanes as did those with their radar off. An order

was prepared to remove the radar sets as a liability.

But wait a minute! The radar set has twice the range of a visual lookout and should cover four times the area. It therefore *should* report about four times as many airplanes, if radar and visual observations are equally effective; and the patrol reports really only proved that the radar was doing its job of better warning. In the end, an order went out to use the radar sets and to keep using them until "radar on" showed at least 10 times as many airplanes as "radar off" did. This never happened and at the end of the war it was verified that no Japanese airplane had had radar detection sets. A lack of quantitative understanding almost nullified the considerable usefulness of radar early warning in this case.

It should also be apparent that the newly developed fields of game theory and communications theory are of great utility in operations research. An example of the use of game theory lies in the aircraft-antisubmarine battle in the Bay of Biscay, off the coast of France, in the last war. The U-boat, as it went out from its base in France, had to come to the surface for a few hours a day to recharge batteries. The longer it ran on the surface, the sooner it could get out of range of the airplanes. The British first used visual sighting and flew only in the daytime. The U-boats, of course, surfaced only at night and submarine losses were small. The British then equipped a few airplanes with radar and searchlights for use at night. The problem was to determine how many such airplanes should be equipped and flown. If they all flew at night, the Germans would surface by day. Moreover, the night attack was not as deadly as the day one. Game theory determined what proportion of day and of night fliers should be maintained in order to keep the Germans most confused and in order to get the most U-boat kills per given cost in equipment, training, and men. Game theory also indicated what were the best tactics for the submarine; what percentage of hours it should surface by day and how often by night.

Many other problems of interest in operations research involve game theory. Certain aspects of the duel problem have turned out to be enlightening in the study of automobile traffic, for example. Other aspects arise in the study of sales fluctuations and the planning of inventory in a nationwide distribution of a product. The various opposing requirements to be balanced include the finite shelf life of the product, the loss of good will when the inventory runs out and items cannot be supplied on demand, and the additional cost of changing factory production too often to catch up on products (Continued on page 214)



Education for Freedom

The Requirement for Self-Government among Men

Appears to be a Fairly High Degree of Development of

Intellectual and Moral Potentialities of the Individual

By JOSEPH H. KEENAN

THE word freedom, as presented in this article, is used to convey an ideal which has grown up in the Western democracies and which can best be signified by two words: dignity and responsibility. Here the word dignity signifies that the individual is of supreme importance, that his welfare is the object of all valid institutions; the word responsibility signifies that no higher authority exists than the individual man, for example, "that governments derive their just powers from the consent of the governed."

If we ask why we should educate for a free society — a democratic society — rather than for an authoritarian society, the answer must be that, over the past two centuries, at least, the institution known as Western democracy has satisfied more successfully the fundamental needs of man than any other institution. It has satisfied in greater measure his needs as an individual and his needs as a social being. For both aspects of his life, man requires freedom from ugliness, violence, and cruelty — with opportunity for developing their opposites: beauty, peace, and love. It is quite clear that this is true of all men, even of those outside the democratic area: otherwise, why should both Hitler and Stalin have proclaimed themselves the champions of peace?

Whereas dictators promise, democracies perform. Democracy has resulted in peace among diverse peoples and even among diverse nations who shared its doctrines. Tyranny, on the other hand, is at best an unstable equilibrium which will ultimately encounter the disturbance that will initiate drastic and violent change. Democracy is not merely freedom from oppression. The requirement for self-government among men appears to be a fairly high degree of development of the intellectual and moral potentialities of the individual. Nothing less than a wide dissemination and a general acceptance of the principles of free inquiry and of individual responsibility will do.

The contemplation of American democracy is not always edifying. When one observes a political campaign, or reads a McCarran Act, one is inclined to wonder whether the American citizen has any concept of either dignity or responsibility. Nevertheless, one might take the other, more optimistic, view to the effect that if the most stable government of the world can be based on such a meager education in the fundamentals of democracy, the possibilities that may result from a serious effort are indeed boundless.

Because of its emphasis on science, an institution like M.I.T. is in a peculiarly fortunate position in regard to education for a free society. It is not an accident that science and democracy grew up together. Science has provided us with intellectual integrity and objectivity — humility before the fact. It has emphasized the importance of definition of terms, logical procedure, and tests for validity. In its broadest sense, the scientific method is free inquiry itself. Percy W. Bridgman, Hollis Professor of Mathematics and Natural Philosophy at Harvard University, has said that the scientific method is the fullest possible use of intelligence, with no holds barred. In this sense, it is apparent that the scientific method must be relevant to virtually all human activity. Certainly it deals with all questions of social value, and thus in one stroke Bridgman has settled the question as to whether social sciences are really scientific.

And yet we must beware that we do not lose the broad view of the scientific method. Although the so-called natural sciences can give us valuable experience in logic, in tests for validity, and in objectivity, they are not sufficient for the educated man in a free society. They overemphasize the problem with the small number of independent variables, the problem to which there is one answer. Among scientists and engineers it is not uncommon to find a feeling of scorn for areas like economics or politics in which the variables are numerous and uncontrolled and the answer is many-valued. This attitude is strong evidence of deficiency in education, since it is in just these areas that the heaviest responsibilities of the individual, scientist or other, must lie.

It is most necessary, therefore, that our education for a free society should provide data on the behavior of man, as well as on the behavior of things. And so we come to history, philosophy, and the arts. It is not the intention in this article to discuss how, or in what measure, these should be taught. But however they are taught, the purpose should be, aside from gathering data, to give the student an experience in free inquiry, to stretch his intellectual capacity, and to build within him the awful sense of the ultimate and complete responsibility for himself and his civilization which he must shoulder.

The accomplishment of these noble ends is not just a matter of drafting curricula and selecting textbooks.

(Continued on page 220)

Automobile Safety



Burk Photo Service from Black Star

SOMETHING is being done — or, more accurately, some thinking is being done — on the tragic problem of automobile accidents, which take a yearly toll of more than 30,000 lives and put one million people into the accident wards of hospitals. Those who are doing the thinking believe that the design of cars, in relation to passengers and pedestrians, has steadfastly ignored Newton's laws of motion, with the result that human beings are exposed to the mercy of very large forces of acceleration and deceleration without having adequate means to withstand them.

An elementary principle of shipping freight is that the goods must be securely fastened down, or packed together, so that the material cannot go adrift as the vehicle moves. In the event of a storm, cargo on a boat would certainly be smashed if a shipowner failed to secure it, and, in addition, his vessel could be ruined by damage inflicted by merchandise. The same principle is basic in all types of flying: cargo, passengers, and pilots are carefully restrained, and airplanes are designed to afford the passengers the utmost protection if a crash does occur.

But in the millions of automobiles rushing about on our highways, not one offers any provision for passenger safety in time of accident. Driver and riders are free to move, to be thrown about, or hurled through doors and windshields if sudden changes of speed or direction take place. Forces of 10 to 20 times that due to gravity (10 to 20G.) are common in automobile collisions; even when making an emergency stop with the brakes in traffic, the average deceleration of 0.75G. will throw a child against the windshield with sufficient force to cause a concussion. Yet both public and manufacturer have apparently ignored the danger,

**More Stringent Traffic Regulations
for Pedestrians and Public Demand
for Minor Engineering Changes Could
Reduce Casualties Appreciably**

By DAVID O. WOODBURY

concentrating entirely upon the prevention of accidents rather than making cars safe. A cursory study of motor-accident statistics of the past 20 years quickly shows that the casualty trend, per passenger mile, is not downward. The reason for this is simple: The instinct for safety and a useful knowledge of the forces involved in accidents cannot be legislated.

Recently, work has been done at Cornell University in measuring the forces to which automobile riders are subjected, and recommendations have been made for the use of safety belts in cars. The most significant contribution so far, however, comes from an independent physicist, William W. Harper, of Pasadena, Calif., who was formerly an assistant to Robert A. Millikan at the California Institute of Technology.

Harper, who for many years was associated with the Pasadena Police Department as a consultant in accident cases, is at present engaged in expert witness work for the courts on the West Coast, and has analyzed thousands of traffic accidents in the light of the Newtonian forces involved. His recommendations, soon to be published, offer an interesting challenge to automobile owners and manufacturers alike. The gist of his findings is very simple, and his recommended remedies seem incontrovertible.

Seat belts, Harper says, are a prime requirement if we are to prevent car riders from being thrown against the dashboard, the windshield, or through the doors. But this is not all. He points out that car seats, which often weigh 100 pounds, are fastened down so flimsily that forces of three to five G. will usually tear them loose. Thus, in a crash of any consequence, the weight of the seat is added to that of the passenger, and

(Concluded on page 218)



Burton Holmes from Ewing Galloway

Founded in the Thirteenth Century, Stockholm is a modern city in every respect.

Study in Sweden

M.I.T. Graduates Broaden Their Education and Promote Good Will by Assisting in Research Programs Abroad

As Reported by JACQUES A. F. HILL, ROBERT N. RANDALL, and RICHARD M. SCHOTLAND

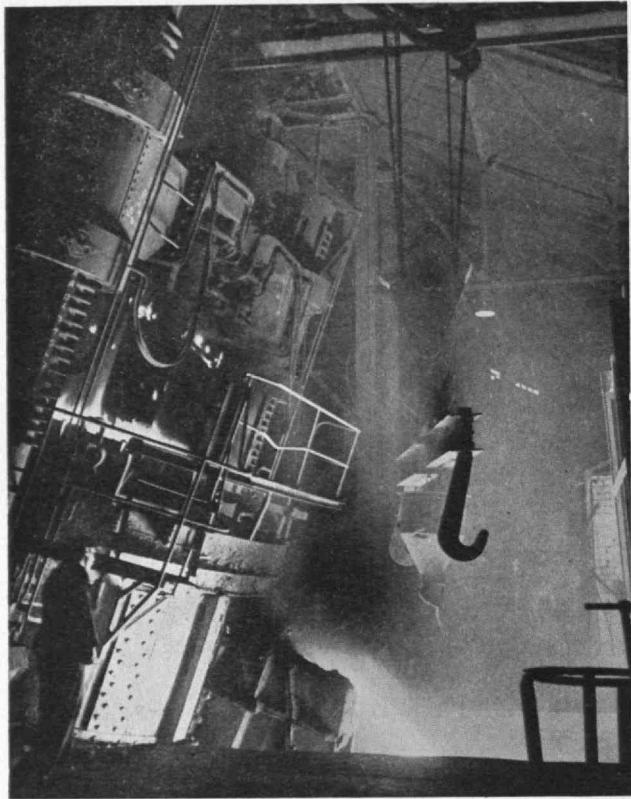
THE great success of the M.I.T. Foreign Student Summer Project during the last three years (see The Review for November, 1948) has called attention to the values to be gained from study and research abroad by advanced graduate students and research workers. To further promote this end, the Institute has planned a similar type of project for its own graduate students. During 1950 arrangements were made with three research institutes in Sweden (the High Voltage Research Institute at Uppsala, the Aeronautical Research Institute of Sweden at Stockholm, and the Stora Kopparbergs Steel Research at Domnarvet), for a group of M.I.T. students to engage in research in that country during the summer months.

Under arrangements worked out by the M.I.T. Foreign Study Committee,* the Swedish institutes accepted a number of graduate students for employment. The students were recommended by M.I.T. on the basis of special proficiency in fields of particular concern to the co-operating research organizations. The students were remunerated sufficiently in local currency to cover living and incidental expenses while in Sweden, and funds placed at the disposal of the Foreign Study Committee of M.I.T. assisted those in need in the payment of transportation between the United States and Sweden.

* The committee is composed of Professors Norman J. Padelford, chairman, Lawrence B. Anderson, '30, Paul M. Chalmers, Harold L. Hazen, '24, John T. Norton, '18, C. Richard Soderberg, '20, and Walter H. Stockmayer, '35.

In each case the M.I.T. students were employed as skilled research technicians on a comparable basis with native workers. This enabled the M.I.T. graduates not only to become familiar with foreign techniques in their own field, but in addition to work in close personal touch for a time with distinguished European scientists and engineers. Moreover, the arrangements permitted the men to develop friendships with young Swedish professional workers with like interests to their own. And informal opportunities allowed them to visit, as well, numerous scientific and industrial establishments in the Scandinavian area.

John R. M. Alger and Eugene B. Skolnikoff, graduates in 1950 of the Co-operative Course in Electrical Engineering, were both employed for two months at the High Voltage Research Institute at Uppsala, which is under the direction of Professor Harald Norinder. Under the direction of Oskars Salka and Laszlo Asztalos, they worked on a project for obtaining suitable analysis of the mechanism of the long spark. Richard M. Schotland, who received an S.B. in Electrical Engineering in 1948 and an S.M. in Meteorology in 1950, was also employed for the two summer months at the High Voltage Research Institute, specializing on measurements of light and heavy ion concentrations in the atmosphere and on the conductivity and potential of the atmosphere, under the direction of Reinhard Siksna and H. Israel. Jacques A. F. Hill, a graduate in 1947 of the Course in Aeronautical Engineering, and now working with the Division of Industrial Coopera-



American Swedish News Exchange, Inc.

Tapping of one of the big steel furnaces at the Domnarvet iron works of Stora Kopparbergs Bergslags Aktiebolag. Robert N. Randall, '50, is spending a year at this company which celebrated its 600th anniversary in 1947.

tion on the Naval Supersonic Research Project, spent the summer months at the Aeronautical Research Institute of Sweden located on the outskirts of Stockholm. Mr. Hill was working on a preliminary investigation of the possibility of transonic wind-tunnel testing using slotted walls in the test section. Robert N. Randall, a graduate in 1950 in the Metallurgy Course, began one year of research at Stora Kopparbergs Bergslags Aktiebolag at Falun, working in the research department under Professor Bo Kalling.

Reports from the overseas study project in the summer of 1950 indicated that it was genuinely useful to all concerned. Research workers in the Swedish institutes gained some familiarity with American ideas of techniques, instrumentation, and research procedures in the process of working together. The M.I.T. students in return learned a good deal about European technical education, Swedish research and industrial methods, Swedish professional advances, and the problems many foreign scientists face without elaborate apparatus and experimental data with which to work. Above all, both the M.I.T. students and those with whom they were associated experienced the rich values of international friendship derived from groups of like-minded scientists working together intimately on common problems across national lines.

Reports made to M.I.T. by three of the students — Messrs. Schotland, Hill, and Randall — describe some of the Swedish scientific institutions, their observations of working and living conditions in Sweden, and the experiences which they had while abroad under the M.I.T. foreign study project.

Swedish Research Facilities

The laboratories of the High Voltage Research Institute at Uppsala, where three of the five students worked, are well equipped for the particular type of research undertaken; for example, High Tension Hall has a two-megavolt Marx impulse generator, a 100,000-ampere current generator, two Van de Graaff generators, and a 500,000-volt transformer. Some of the smaller instruments found in laboratories in the United States, which are useful only because of their convenience, are frequently missing.

The scientists at the High Voltage Research Institute are outstanding men, both from the point of view of their scientific attainment and their personalities. Founded by Professor Harald Norinder of the University of Uppsala, one of Europe's leading authorities on high voltage and atmospheric tension, the Institute staff includes a number of eminent displaced scholars forced from their own continental universities by Soviet occupation, together with visiting scholars temporarily present in the summer period to participate in the Institute's field studies in atmospheric electricity. Among those at Uppsala in the summer of 1950 was H. Israel, one of the world's authorities on atmospheric electricity.

The Aeronautical Research Institute of Sweden, located on the outskirts of Stockholm, has a position in the aeronautical field in Sweden similar to that of the National Advisory Committee for Aeronautics in this country. It is directed by Bo Lundberg, who has in the past spent considerable time in aeronautical research and aviation industries in the United States and various European countries. While aeronautical work is done at other places in Sweden, such as the Royal Technical High School at Stockholm and the Swedish Aircraft Company (SAAB), the most elaborate and expensive equipment is located at the Aeronautical Research Institute, which is a government facility working both for the civil and military air services.

The work at the Aeronautical Research Institute is divided into two broad fields — aircraft structures and aerodynamics. The structures department has large testing machines which are capable of handling full-scale airplanes up to light twin-engine craft, a landing gear drop test machine, and many smaller machines for testing materials both statically and dynamically. The aerodynamics department has wind tunnels for subsonic, transonic, and supersonic testing. The test section diameters are 10 feet, 3 feet, and 9 inches respectively. The wind tunnels and their associated equipment are less expensively and less elaborately constructed than they would be here, except for the low-speed tunnel. The pump used for evacuating the vacuum tanks for the supersonic tunnel, for example, is a Packard-Merlin aircraft engine obtained from an Allied airplane which landed in Sweden during World War II. On the other hand, the models and the measuring equipment are very skillfully built and may even be superior to equivalent items in America.

The staff at the Aeronautical Research Institute seems very small when considering the ground to be covered. Until last year, only one man was employed for theoretical supersonic work, and he also had to supervise all experimental work in that field. Notwith-

standing the smallness of staff and limitations in basic equipment, a large amount of practical work has been going on at this research institute. Ingenuity and skilled effort have compensated for inadequacies in equipment.

The Stora Kopparbergs Bergslags Aktiebolag (translated as the Large Copper Mountain Company but commonly referred to in Sweden as Bergslaget) is a combined steel, paper, and chemical company. It owns three steel plants, two paper and pulp mills, and numerous mines and timber areas, with its activities located in the central part of Sweden with headquarters in Falun, a small city about 150 miles northwest of Stockholm. The company is believed by many to be the oldest corporation in the world. In 1947 the company celebrated its 600th anniversary.

Originally Bergslaget was exclusively a mining company operating the famous copper mine at Falun. Copper from this mine helped to finance the many wars of Sweden in the Sixteenth and Seventeenth Centuries. Much Swedish history has been connected with this mine in times of peace also. The distinctive red paint which covers almost every farm building and home in central Sweden is a product of this mine. In the Nineteenth Century, however, the rich copper ore began to be depleted and Bergslaget turned to iron and later to timber products for revenue. Situated as it is along the Dal River, it has ample water for use in manufacturing, for transport of logs, and for electric power.

The section of the research department which deals with iron and steel problems is called *Forskningscentral*. This is headed by Professor Bo Kalling, one of Sweden's leading metallurgists. The department is located at the Domnarvet Ironworks in Borlänge, a city about 13 miles south of Falun. This plant, the largest steel plant in Sweden as to tonnage, employs about 2,800 men and produces about 210,000 tons of steel per year. It is currently being expanded so that the capacity will be doubled in the near future. The electric steel and basic Bessemer processes are used here to convert the blast furnace iron into steel. The majority of the tonnage comes from the basic Bessemer converters. The final products are primarily low-carbon rolled wire, strip, sheet, plate, and structural shapes. Alloy and stainless steels, together with sponge iron, are produced at another plant (Söderfors works — capacity 10,000 tons per year).

The efforts of the research department, which has seven engineers currently on its staff, are directed to problems in process and physical metallurgy. In addition to one section of the central plant laboratory, where most of the physical metallurgical work is handled, there is one whole building where work is conducted on both a laboratory scale and with pilot-plant equipment. For purposes of comparison, it is a building somewhat larger than the Metal Processing Building (no. 35) at M.I.T. This building houses offices, two laboratories, and a large work area for pilot-plant use. It has its own staff of laborers and artisans.

Much of the research work is concerned with the development of new processes and the efficient utilization of by-products. Work is carried out on problems which develop during the operation of the plant and

also on ways to improve the company's products. Research projects at present include the control of nitrogen in steel, the effective use of oxygen in steel production, the removal of sulphur from iron and steel, and the efficient production of sponge iron. Whereas interest in the first three subjects is rather universal, the last problem, at least at present, is almost exclusively a Swedish one.

Sweden has always shown an interest in high purity irons, such as charcoal iron and sponge iron. In the last few years the price of charcoal has made the use of this material unprofitable, and therefore much attention has been given to the production of sponge iron as a source of high purity iron. This iron is used in the production of the famous Swedish cutlery and alloy steels, which the Swedish people feel should be made from pure materials.

Mr. Randall's research work is connected with problems involved in the control of sulphur and nitrogen in steel. Professor Kalling has given him much freedom in his work and several helpful suggestions. Mr. Randall finds the work interesting and stimulating. He reports that there is good teamwork among the engineers and that ideas are readily exchanged. The other engineers have been very generous in offering help and suggestions.

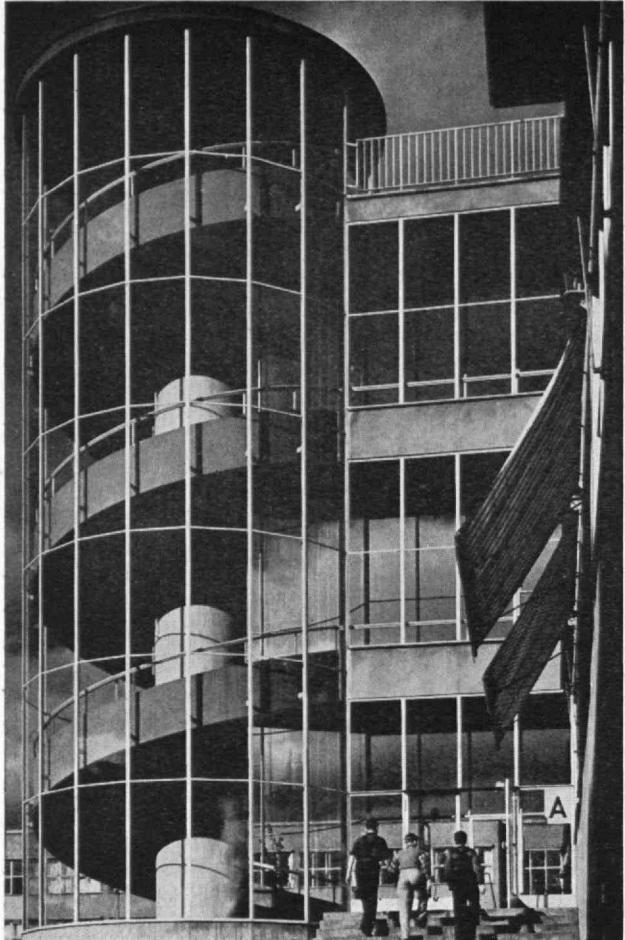
Travel

The M.I.T. student group at Uppsala was able to spend many week ends traveling in Sweden and elsewhere. Longer trips were made possible to Norway, Denmark, Finland, the Island of Gotland, and the Swedish Alps. An important part of these trips was the opportunity to make contacts while traveling; for example, while they were en route to Finland, Messrs. Schotland, Alger, and Skolnikoff met Professor Järvi of the University of Turku. He arranged hotel accommodations and invited them out to his villa on the Baltic.

Language

For Americans there is but a slight language problem in Sweden. Almost all Swedish engineers have six years of English in their training, and M.I.T. students found no trouble as far as professional work is concerned or in traveling. In the smaller towns one also can usually find people who at least know a little English. One problem, related to language, that does baffle many Americans at first, is the use of the metric system rather than the English system of units. Americans find it somewhat difficult to think of persons as being 188 centimeters long or weighing 84 kilograms.

The Swedish people, in general, appeared to be much more interested in learning foreign languages than are Americans. Most engineers know English and German and may know French as well as Spanish. Esperanto is fairly popular with the people in Sweden. In the early autumn the press is full of advertisements for language lessons. English is the most popular of the various languages offered. One school teaches both English and American. In Falun, during World War II, an impetus was given to the learning of the English language by the presence of about 400 American airmen who were interned there. Most of the girls in their twenties know English quite well now!

*American Swedish News Exchange, Inc.*

This industrial school in Stockholm is typical of the modern educational institutions in Sweden, which are built to let in as much sunshine and daylight as possible.

Swedish is not too difficult to learn. It contains many English and German words, and the grammar, in many respects, is similar to English grammar. Even in the short summer period, the M.I.T. students found it possible to pick up a limited familiarity with the language, and found that this was important in getting the full benefit of their job and visit.

Living

All of the M.I.T. students enjoyed opportunities of associating closely with the people and workers living in the vicinity of the various research plants, thereby gaining an insight into the folkways and attitudes of the Swedish people.

Living accommodations at Uppsala were good. The High Voltage Research Institute provided the three M.I.T. students with two rooms and a kitchen in a nearby house — all equipped with comfortable modern furniture. The equivalent of \$40 a month in Swedish currency was sufficient to cover the cost of meals and small incidental purchases.

Living accommodations in Stockholm for Mr. and Mrs. Hill were arranged by the Aeronautical Institute of Sweden. The two Americans shared an apartment with a Swedish engineer and his wife. The apartment was located fairly near the center of town. This arrangement was very happy for both couples as it provided an exchange of ideas about their respective countries.

As the Swedish engineers are the product of an educational system somewhat different from the American, a comparison may be of value. A child in Sweden begins school when he is six or seven years old. He attends a "folk skola" or grammar school for five years and then can choose which of three paths to follow. He may attend for one more year and then conclude his education after attending a trade school for one year. Many children do this, but fewer are discontinuing now than have in the past. His second choice is to attend an intermediate school for five years and then the "gymnasium" (comparable to the U.S. high school), for two years. A third choice is to attend the grammar school for one more year, and then an intermediate school for three years, and the gymnasium for three years. In either of these two latter plans, he can drop out after completing a total of seven years of school.

Following the gymnasium a student planning to attend a university or technical high school takes a student examination, which is a comprehensive examination covering all his work and which is required for admission to a university. Those who successfully complete this examination wear a distinctive white cap.

Following the student examination, the Swedish boy generally spends nine months in the army, for every Swedish male between the ages of 20 and 45 is subject to military training and must receive at least the basic nine months' course. Those planning an engineering career then attend one of the several technical schools — the most prominent of which are in Stockholm and Gothenburg.

The standard course at the Royal Technical High School at Stockholm (KTH) is of no fixed length but usually takes four years and is begun at the age of 19 or 20. It leads to a degree rating somewhere between an S.B. and an S.M. The emphasis is on mathematics and fundamental science in the first two years, and professional topics in the last two. The aeronautical engineering course was discussed in detail and turned out to be almost exactly similar to the one at M.I.T.; for instance, the mimeographed students' notebooks on theoretical aerodynamics have the same chapter headings. As at Technology, there has lately been more emphasis on the humanities, and the Students' Union has been inviting poets and politicians, impartially, for talks in much the same way as the M.I.T. Lecture Series Committee.

To graduate from the Royal Technical High School (College) in Stockholm, one must, in addition to the prescribed course, have completed six months of practical work. This work consists of employment in industry where the student puts on overalls and works with the regular workmen in order to learn their problems and points of view. Before graduating he must also complete a thesis project. This work is often accomplished away from school in an industrial plant. When done in this way, the project amounts to about three months of solid work. The standards of the other technical schools are similar to the government-operated Stockholm school. The main difference is in the variety of courses offered and the quality of the teaching. It takes most students five years to complete an

engineering course, although it is possible to do it in four years.

As can be seen, the graduating Swedish engineer is somewhat older than his American counterpart. His academic training has been roughly the same, but he has had more practical experience and acquired more practical ability. This practical experience is important here, for few companies have training programs, and a young engineer is put directly into a responsible position.

One comment on an M.I.T. education was heard when a student from Stockholm expressed his astonishment at the number of courses in the humanities that are offered.

At Uppsala the university was closed during the summer months so that there was little opportunity for contact with student life. However, the university sponsors a course on Swedish life for foreign students and this gave the M.I.T. delegation the opportunity to meet many young people from various countries. The group attending this course comprised many nationalities, including a number of refugees from countries behind the Iron Curtain. The English language was a common denominator so Americans had no difficulty in becoming one of the group and entering into social life. Student gatherings were usually held around a coffee pot and began with discussion of world affairs and similar topics, often ending with a song fest. The students all seemed to have a good store of knowledge outside their own fields. Aside from being competent linguists, many had a lively interest in music and the arts.

In Stockholm too, things seemed pretty quiet during the summer. Most people took advantage of the summer weather to spend week ends outdoors — sailing and bicycling being favorite sports for which excellent facilities exist. A few gatherings (men students only) of some of the Aeronautical Research Institute engineers were held. Women seem to take a less active part in social life in Sweden than they do in the United States. As at Uppsala there would be lively discussions on serious topics, periodically interrupted by the serving of refreshments. Almost everyone was well acquainted with the humanities, and furthermore expressed doubts that culture was as well developed in the United States as in Sweden. In any case, the Swedish people were much better acquainted with our country than we were with theirs.

Customs and Life

General impressions of Sweden begin with the fact that it is a very prosperous country by most standards, and especially by comparison with its neighbors. Almost anything which is available in the United States can be obtained in Sweden; and only seldom is the price higher when converted at the current rate of exchange. On the same basis, salaries, as well as necessities such as food and rent, are about half as much as in this country. Consequently automobiles,

Old customs and colorful costumes are still treasured in Sweden, especially in the province of Dalecarlia, where observance of Midsummer Eve, shown here, is one of the oldest annual festivals of that country.

refrigerators, and washing machines become luxury items owned by comparatively few. On the other hand, boats and summer homes are much more commonplace than in America.

In many ways Sweden is much like the United States but there are some things that immediately attract attention. One of the first things that was noticed was the conservativeness of the dress, the number of berets, and the knickers and short pants worn by the men. The short pants are only worn for sport or when relaxing at home, but the knickers are quite commonly worn as business dress. The color and design of American ties and socks usually draw amused comment. One also notices the distinctive folk dresses worn by many of the women in rural Sweden. Each village has its own distinctive design. On Sundays, at parties and weddings, and particularly on Mid-Summer's Day (June 23, a holiday in Sweden), one can see these decorative costumes.

The formality attendant on everyday relations in Sweden seems stiff and awkward to one used to the informality of America. The Swedish people do not feel comfortable speaking to a stranger on a train or at a public gathering. An introduction must always be made before conversation can begin. In Sweden men take their hats completely off not only when meeting a female acquaintance, but also when meeting male acquaintances and especially when meeting a superior. Everyone has a title and uses it. One is not addressed simply as "Mr. Swenson" but as "Engineer Swenson" or "Railroad Clerk Swenson" or "Technical Student Swenson." The necessity for shaking hands impresses the American visitor. At parties one proceeds, upon arriving, to shake hands with everyone present, and everyone arriving later will in turn shake hands with him. This can be a tiresome procedure at a big party.

Skål, perhaps the one Swedish word that is known throughout the world, is quickly reintroduced to the visitor to Sweden. The first time he uses it may be when he downs his first glass of *snapps*, a fiery beverage made from potatoes. Incidentally, some Swedish people have claimed that potatoes are one of the best things that were ever imported from America. Hard liquor is rationed in Sweden, but no one except a heavy drinker suffers hardship. Wine and beer are not rationed, but their manufacture and sale are con-

American Swedish News Exchange, Inc.



trolled. The beer is weaker than American beer and generally not very cold. (The best beer is exported.) One sight shocking to Mr. Randall was that of a man warming his beer by the stove before drinking it.

Coffee is the only other item that is rationed. It is both a popular beverage and a social institution. In Sweden one does not drink coffee with the meal but afterwards, often in the living room rather than in the dining room. It may be the center of a small meal in the late afternoon or early evening, particularly on week ends or when guests are present.

The *smörgasbord* is nowadays probably found more often in the United States than in Sweden. During World War II it was prohibited, and it has been slow to come back.

The amount of outdoor activity is impressive in Sweden. It is in part because of the decentralization of industry which permits many people to live within only a short bicycle ride of the open country. Another reason may be the long, dark winters. In the summer, everyone wants to get as much sun tan as possible. People almost move out of their houses; everyone stays outside as much as possible. Connected with this love of the sun is the love of gardening and of flowers. Almost everyone in Sweden will have a garden if he can, and his home will be filled with flowers and vines of every description.

One other nice feature of Swedish life should be mentioned. In almost every Swedish community except Stockholm, there is a *Folkets Park* and a *Folkets Hus* (People's Park and People's Theater). Here, at the park in the summer and the theater in the winter, are presented plays, ballets, speakers, and other attractions. The drama may be presented by a resident company or by the State Theater, which brings the plays of Stockholm's theaters, together with the actors, to every part of Sweden. No matter where one lives, there is opportunity to see some of the best stage productions that are to be seen in Sweden.

Despite all these things in Sweden, there are some things that are missed. There are few automobiles, and they are considered a luxury. There are no large, juicy steaks, and there is more fish in one's diet. Basically, however, life is about the same as in the United

Hydroelectric station. Much of Sweden's power is derived from its rivers. Here is shown the Långhags hydroelectric plant of Stora Kopparbergs Bergslags Aktiebolag, on the Dalälven River.

American Swedish News Exchange, Inc.



States. Although luxury items are more expensive and more things are considered luxuries, food, taxes, and lodging take a smaller per cent of one's income so that one has a greater part to spend on other things.

Politics and Social Conditions

Sweden, along with the other Scandinavian countries, has been compared to England in regard to socialism. Sweden, however, has not gone as far as England, and Mr. Randall reports that most of the Swedish people he has met do not think of their country as being socialist. As these people have been mostly engineers, the view may be somewhat misleading.

The M.I.T. groups at Uppsala and Stockholm reported that socialism seemed pretty generally accepted by the people they met. They did not hear any criticism of the principle such as one hears from so many people in America. There were some complaints about the high taxes, which amount roughly to 20 per cent on a salary of \$120 a month. However, this tax pays for a very complete welfare program, including free medical care in almost all cases. During the campaigns for the municipal elections in September, the other parties did not oppose the welfare aspects of the socialist program. The Conservatives promised to reduce taxes and the Liberals promised to provide more benefits than the Socialists. The result was that the former lost ground while the latter gained — the Social Democrats winning as usual.

Workers are very proud of the benefits that are available to them in Sweden. There has been much boasting about the social legislation which has given the Swedish people a high standard of health and some protection in their old age. On the other hand, the engineers have said that often a man who is away from work, because of illness or injury, may make more money than if he were working. This quirk of the law, together with the labor shortage in Sweden, makes it very difficult to keep absenteeism to a minimum and to maintain discipline. It is also more difficult to enforce safety regulations. There is not the safety consciousness in the Swedish worker that there is in the American. Management in some industries has found that when health benefits were increased, the accident rate was also increased. In any case, little is done at present, to promote safety. One notices immediately the lack of safety features that are commonplace in most American industrial plants.

All feel that medical costs are very low in Sweden. It has been said that Swedish people, living in America, have sometimes gone back to Sweden for operations. Medicine is not socialized as in Great Britain, but there is a medical plan run by the government which works in somewhat the same way as the Blue Cross Plan. This covers everyone, and the rates are very low.

As in England, the railroads are owned by the government. The last portion to be taken over was that between Gävle and Gothenburg, which was placed under state control about three years ago. One opinion seems to be that the railroads are well operated, but that they were operated better when the government had to compete with a private operator. One can cer-

(Continued on page 210)

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Awards to Compton

KARL T. COMPTON, chairman of the M.I.T. Corporation, was the recipient of two high honors in recognition of his work in advancing the nation's welfare through technological progress.

The 1950 Hoover Medal for "distinguished public service" was presented to Dr. Compton at the winter meeting of the American Institute of Electrical Engineers in New York. On behalf of the four major engineering societies in this country, the Hoover Medal was awarded in tribute to a "great leader in engineering education who has had a profound influence on the development of science and engineering and has devoted himself wholeheartedly to the welfare of the nation, both in times of peace and in times of war." Dr. Compton is the twelfth engineer to receive the medal since it was first presented to former President Hoover in 1930 for humanitarian accomplishments.

From the Research Society of America, Dr. Compton received the \$1,000 William Procter Prize for scientific achievement. The presentation was made during the recent meeting of the American Association for the Advancement of Science in Cleveland. Much as the honorary research fraternity, Sigma Xi, with which it is associated, recognizes outstanding achievement in academic circles, the Research Society of America recognizes outstanding research in industry.

Biochemical Engineering Course

RECENT developments in the production of pharmaceuticals and antibiotics, and in the food and fermentation industries, have indicated a strong need for technical personnel with training in the basic biological sciences and in engineering as represented by Chemical Engineering. In order to make such training available to students who wish to enter this field, a new course leading to the degree of bachelor of science in biochemical engineering has been instituted as Option XX-B in the Department of Food Technology. Graduate work for qualified students is also available, and a research program is in progress.

The curriculum now offered is basically the undergraduate curriculum in Chemical Engineering with modifications to allow courses in biology, bacteriology, microbiology, and biochemistry. All courses contained in the curriculum are currently offered by various Departments at the Institute; however, if warranted by future enrollment, several new courses are planned which will give the students a more thorough background in microbiology and biochemistry. New courses covering the Chemical Engineering subjects of industrial chemistry and unit operations are also being developed in the Department of Food Technology in which the emphasis will be on the biological, rather than the chemical, industry.

On the Freshman Roster

THIRTY-SEVEN freshmen who registered in the first-year class at M.I.T. this fall were re-enacting their parents' actions of a generation or so ago. The present count of the Freshman Class is 792 and of this number there are 35 sons and two daughters of Alumni of the Institute. The distaff side being in the minority, we note particularly in the listing below, Miss Marilyn Fraser, daughter of Alfred A. Fraser, '20, and Miss Carolyn E. Hannauer, daughter of the late Louis Hannauer, '32.

With the realization that the humanities and social sciences now play a stronger part in the curriculum of an engineering school, Alumni will watch with interest the manner in which their children will apply the same fundamental principles of science and technology which they learned as freshmen two decades or more ago. Although influence, however indirect, should not be brought to bear in the selection of a college, the Institute welcomes with pleasure the following who undoubtedly have been exposed to a slight M.I.T. aura:

Student	Parent
John L. Allen	Lawrence H. Allen, '20
Joseph K. Allphin	Willard J. Allphin, '25
Richard P. Blye	Paul W. Blye, '19
Henry T. Brockelman	Bernard B. Brockelman, '29
Charles W. Burnham	Charles H. Burnham, '22
Charles J. Carpenter	C. Clinton Carpenter, '16
Paul B. Carty	Maurice W. Carty, '04
Donald A. Coleman	Albert F. Coleman, '31
James J. Coles	James A. Coles, '25
Evan T. Colton	H. Seymour Colton, '21
Gordon R. Comings	Edward W. Comings, '34
James H. Davidson	Jesse I. Davidson, '27
Edward L. Davis	Malcolm G. Davis, '25
Paul R. Drouilhet, Jr.	Paul R. Drouilhet, '37
Herbert H. Ellis	Ray C. Ellis, '22
Peter Felsenthal	Robert M. Felsenthal, '21
Emerson K. Fletcher	Ralph A. Fletcher, '16
Richard S. Foster	F. Leroy Foster, '25
Marilyn Fraser	Alfred A. Fraser, '20
Raymond F. Freeman	Raymond A. Freeman, '26
Paul E. Gabrenas	Anthony P. Gabrenas, '26
Erik M. Gelotte	Ernest N. Gelotte, '23
Roger L. Griffin, Jr.	Roger L. Griffin, '24
Peter E. Griswold	Earle A. Griswold, '23
Carolyn E. Hannauer	Louis Hannauer, '32 (deceased)
Ernest C. Hinck, 3d	Ernest C. Hinck, Jr., '27
Charles E. Loud, Jr.	Charles E. Loud, '23
Melvin R. Mattson	John B. Mattson, '21
Decker G. McAllister, Jr.	Decker G. McAllister, '21
John E. McNary	Herbert L. McNary, '18
Donald R. Mott	Edward E. Mott, '27
Emmanuel J. Otis	John P. Otis, '18 (Vokhliotes)
William B. Price	Richard P. Price, '25
Benjamin T. Rauber, Jr.	Benjamin T. Rauber, '14
Whitman A. Richards	Arklay S. Richards, '19
Mahlon R. Saibel	Edward A. Saibel, '24
Richard D. Tooley	Douglas A. Tooley, '28

Course I Grows

THE continued growth of the Department of Civil and Sanitary Engineering during the past year, which emphasizes its remarkable expansion during the five years that it has been headed by Professor John B. Wilbur, '26, was favorably noted during meetings of this Department's Visiting Committee* on March 6 and 7, 1950. Since 1945, the Department enrollment has grown from 82 to 298, an increase of 260 per cent. Not since 1926 have there been as many students who signified a desire to register in this Department of the Institute.

The increase in sponsored research during this same interval is even more striking. Five years ago there was no program of sponsored research, while today the research contracts in effect total \$364,000 — with this program shared almost equally between the Divisions of Structural Engineering, Soil Mechanics, Hydraulic Engineering, and Sanitary Engineering. The projects involved are varied and important, and are of special value in stimulating the educational program of the Department, while at the same time indicating the importance of continuing research.

The growth of laboratory facilities during the past five years also deserves special mention. The new William Thompson Sedgwick Laboratories of Sanitary Science, with their engineering, chemistry, and bacteriology sections, have been developed. The Photogrammetry Laboratory is playing a significant part in teaching courses in surveying. The structural laboratories have been augmented by the Structural Dynamics Laboratory and by the Concrete Laboratory, that is now being rebuilt. The Soil Mechanics Laboratory has been expanded to include a section devoted to chemical and thermal analysis. Most important of all, after years of planning and discussion, the construction of the new Hydrodynamics Laboratory has been completed and the building is in use, located on Vassar Street, Cambridge.

With these new facilities, an increase in the quota for graduate students should be considered. In particular, the completion of the Hydrodynamics Laboratory will make it possible for the Institute to expand its field of influence. A number of inquiries from qualified students of foreign countries suggests that, in the field of hydraulics especially, restrictions in the enrollment of foreign students should be eased since the fields of civil and sanitary engineering are of particular significance in the less developed portions of the world. Undue restrictions regarding the enrollment of foreign students in these fields can curtail the opportunities of the Institute for effective contribution on a world-wide basis.

The courses in hydraulics have been expanded during the past few years, but in view of the Institute's unusually favorable position in this field with respect to both staff and facilities, still further expansion should be considered. A broadening of courses dealing with hydraulic engineering, and the addition of

courses in hydraulic machinery are desirable. The field of transportation engineering appears to offer unique opportunities for service on the part of the Department to a degree beyond that developed at the present time, since traffic congestion is a major problem in the metropolitan areas and airport design has yet to evolve on an over-all functional basis that is well adapted to operational problems. The Committee believes that the social and economic importance of these and similar aspects of transportation problems warrant a consideration of expanding the work of the Department in this field.

The Committee favors the proposal, now being considered by the Sanitary Division, to offer a course leading to the degree of master of science in sanitary science. Such a program would emphasize the chemistry, bacteriology, and biology of the operational and research phases of Sanitary Engineering, and deal less with the design phases of the field. While it is expected that attention will continue to center on the degree in Sanitary Engineering, the proposed degree will broaden the scope of work being done by the Division. This can be accomplished without offering any new subjects.

The Committee is impressed by the progress made in the Department during the past five years, by the vitality of its present condition, and by its constructive plans for the future. The Department is ably staffed by leading teachers, and the policy of bringing people with first-class talent to the staff of the Department, and providing them with facilities that permit them to develop their areas of endeavor, is leading to results that, though already notable, hold even more promise for the future.

Economists Parley

THE Visiting Committee on the Department of Economics and Social Science* held its meeting on June 8, 1949. Members of the staff present were: John E. Burchard, '23, Dean of Humanities, Professor Ralph E. Freeman, Professor Charles A. Myers, and E. Cary Brown, Assistant Professor of Economics. James R. Killian, Jr., '26, President of M.I.T. joined the Committee for the luncheon period.

The Committee's report of a year ago was reviewed as a point of departure. It was recalled that the earlier report suggested a broadening of the list of required readings for the course in economic principles, with a view to more adequate recognition of the varying points of view regarding economic theories. The staff presented a number of examples of material which is now being used for this purpose. It was the feeling of the Committee members that much better balance exists in the reading material. The student now appears to be getting a more adequate presentation of orthodox, or classical, thinking which he can contrast and compare with some of the newer theories. The Committee believes that this will stimulate more careful and critical economic analysis on the part of the

* Members of this Committee for 1949-1950 were: Thomas C. Desmond, '09, chairman, Allan R. Cullimore, '07, Richard H. Gould, '11, C. George Dandrow, '22, George J. Leness, '26, Boris A. Bakhmeteff, and Thomas F. Farrell.

* Members of this Committee for 1948-1949 were: Charles E. Spencer, Jr., chairman, Hugh Pastoriza, '07, Ellis W. Brewster, '13, Oscar S. Cox, '27, William A. Coolidge, Beardsley Ruml, and Samuel S. Stratton.

student and not leave him without an anchor, should some of the more recent and partially tested theories prove inadequate to these changing times.

The Committee devoted much time to a consideration of Course XIV, Economics and Engineering. This Course is designed for those planning to enter fields where the knowledge of economics is of major importance, since the two optional fields are Human Relations and Industrial Economics. On the other hand, in terms of units, 60 per cent of the emphasis is on engineering, science, and mathematics; and 40 per cent of the time is devoted to subjects in the Division of Humanities, such as languages, English, history, business administration, economics, and other social sciences. The opinion had been expressed that this requirement should be relaxed to allow somewhat greater emphasis in the broad field of social studies. After some discussion, it was decided that this is a matter which could much more appropriately be decided by the Administration, should it decide to look into this further.

On Stage

GRATIFYING to the Institute was a request for a program of *The Grand Duke* — the first American showing of Gilbert and Sullivan's opera — which formed a part of the Tech Show given at the Hollis Street Theater in Boston on May 3, 1901.

The appeal emanated from the Pierpont Morgan Library in New York City, which recently opened a public exhibition devoted to the work of Gilbert and Sullivan. The Library, which perpetuates the collections begun by J. Pierpont Morgan, is one of the richest in resources in the United States and its exhibitions are famous. It is well known for its special collections of illuminated manuscripts, incunabula, rare books, etchings, original drawings, coins, and metals.

Unfortunately, the Institute did not have a program of *The Grand Duke* available but an excellent poster was found in the M.I.T. archives and loaned through the Hayden Library for the exhibition. Examining old copies of *The Tech*, however, ample news and editorial comment referred directly to Tech Show. On March 7 a last-minute bulletin announced that "a Gilbert and Sullivan opera which has never been hitherto produced in this country" would be featured. "*The Grand Duke* is a brilliantly amusing and picturesque bit of nonsense, admirably adapted to the needs of a college show, and to have the distinction of giving it its first presentation on the American stage, is no small feather in the theatrical cap of 'Tech.'"

The production committee included Allan Winter Rowe, '01,* James B. Laws, '01,* and Dr. William J. Mixter, '02. The show was put into rehearsal in early March and was reported in the issue of March 28 in most encouraging terms. Lewis Emery, '99,* was chosen as the leading lady, Matthew C. Brush, '01,* as Ernest, Herman O. Blatt, '04, as Ludwig, and the title role was awarded to James Driscoll, '02. Dr. Rowe, Thomas G. McDougall, '04, Gerald F. Loughlin, '03,* Paul McC. Paine, '04, and Selskar M. Gunn, '04,* completed the roster of principals. Among the features

* Deceased.

were a delightful "statutory duel" with playing cards (as shown in the poster reproduced on this page), a ballet, and a Dutch sabot dance of 10 peasants dressed in the national colors of orange and yellow. Large advance ticket sales were reported, and in due course Tech Show was presented before a large and appreciative audience. In the issue of May 9, the production was reviewed critically with the conclusion, "Considered as a whole *The Grand Duke* was a decided success."

Almost half a century has passed since the première of *The Grand Duke* at M.I.T., but Tech Show goes on, and *The Tech* itself, now a full-fledged biweekly, continues to record life at the Institute for the present and for the future.



Reproduction of poster loaned by Hayden Library to Pierpont Morgan Library, New York City, for inclusion in exhibition of Gilbert and Sullivan's works.

Outstanding Electrical Engineers

THREE recent graduates of the Institute's Course in Electrical Engineering were singled out for high honors as a result of outstanding achievements in their professional fields.

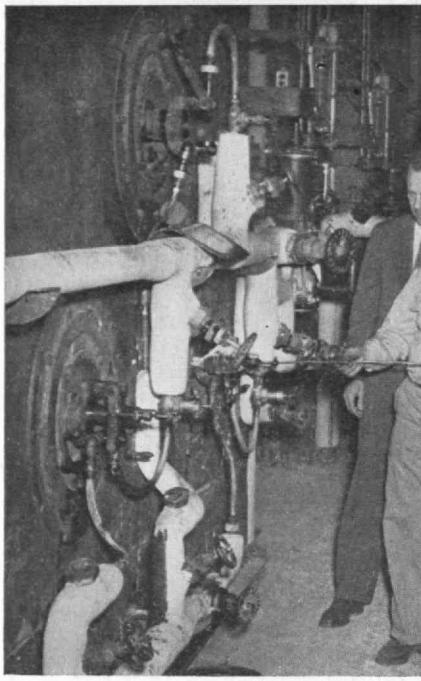
Donald P. Campbell, '43, has been awarded the Eta Kappa Nu plaque in commemoration of his selection as "the most outstanding young electrical engineer for 1950." Dr. Campbell is an assistant professor of electrical engineering at the Institute, and has made significant contributions in applying servomechanisms to industrial operations.

Robert W. Mayer, '41, was the recipient of an honorable mention certificate from Eta Kappa Nu, honorary electrical society. The presentation was made during the winter general meeting of the American Institute of Electrical Engineers.

Ralph J. Kochenburger, '40, received the Alfred Noble prize for 1950 for his original studies on automatic-control systems. The Noble prize is a joint award of the four national engineering societies and the Western Society of Engineers. The award has been made to Dr. Kochenburger for his paper which was read at last year's meeting of the American Institute of Electrical Engineers.

Director of Business Administration

THE appointment of Robert M. Kimball, '33, as Director of Business Administration at Technology, has been announced by President Killian. In this ad-



M.I.T. Photo

Two new boilers, with a total combined capacity of 140,000 pounds per hour, have been installed at M.I.T. to fulfill the steam requirements of the Institute occasioned by the construction, especially within the past four years, of additional buildings on the campus. Placed in service on October 23, 1950, and January 4, 1951,

respectively, these two boilers are replacements of installations of 1916 when M.I.T.'s first power plant was constructed in Cambridge. The original steam requirements were supplied at two pressure levels: the higher level, at boiler pressure of approximately 185 pounds per square inch and 450 degrees F. temperature, provided steam for laboratory use and certain service requirements; and at the lower level, at the exhaust pressure of one to two pounds per square inch, provided building heating.

Lighting off the second new boiler in January were (from left to right): Robert M. Kimball, '33, Director, Division of Business Administration; Verner G. R. Johnson, Foreman, Boiler Room; Joseph J. Snyder, 2-44, Treasurer; Jerome H. Barraford, Assistant Superintendent, Buildings and Power; and Charles G. Turgis, Chief Engineer, Boiler Room.

ministrative post, Mr. Kimball, as head of the new Division of Business Administration, will direct the nonacademic activities of the Institute.

He will serve as chairman of the Building Committee, and direct the Department of Buildings and Power, the Office of Housing and Dining Services, the Personnel Office, and the Safety Office.

Acting Head

PROFESSOR Bernard E. Proctor, '23, Director of the Samuel Cate Prescott Laboratories of Food Technology, has been appointed acting head of the Department of Food Technology, following the resignation of Professor William L. Campbell, '15, who has accepted a position in industry.

Hull and Salt Spray

THE Visiting Committee on the Department of Naval Architecture and Marine Engineering* convened on May 19, 1950, in the office of Vice Admiral Edward L. Cochrane, '20, formerly Head of the Department, now on leave of absence in government service since September, 1950.

The allocation to this Department of the rooms formerly occupied by the Dard Hunter Paper Museum, now housed in the new Charles Hayden Memorial Library, assures adequate space in all areas under present methods of operation. The progress which has been made on the construction of the new Ship Model Towing Tank is particularly gratifying. In addition, a small tank, or stability basin, is being designed for laboratory studies of the stability of ships in both in-

tact and damaged conditions, of end-on and sideways launchings, and of similar hydromechanic problems. It is anticipated that this tank, as well as the Ship Model Towing Tank, can be ready by the spring of 1951. The opening of the Ship Model Towing Tank and of the stability basin will strengthen the facilities of the Department materially. To gain the benefits expected from them, however, an increase in teaching and research staff is imperative. For the school year 1950-1951, at least, this need will be met by adding an instructor and a half-time teaching assistant to the Department's staff.

With the transfer of Economics and Industrial Relations material to the new Charles Hayden Memorial Library, additional space has been made available in Building 5 for the Engineering and Naval Architecture Library. The Committee urges early action in effecting the plans to provide for storing, with suitable security, and making readily available the valuable collection of nautical books formerly in the Hart Nautical Museum and also for taking custody and handling the theses libraries of the various engineering departments served. The replacement in this library of the reference books essential for the work of the considerable number of students using this branch is a matter of urgency. These books should manifestly include atlases, current books and periodicals on naval architecture and marine engineering, indexes, a modern encyclopedia, suitable foreign language dictionaries, and current yearbooks. It also appears important to provide good daily newspapers in the branch libraries, but in this respect the Engineering and Naval Architecture Library is poorly supplied.

The Committee heartily endorsed the plan to have students in Course XIII-C, Marine Transportation, take their training at sea during the summer periods. A plan for the students in Course XIII, Naval Architecture and Marine Engineering, to obtain sea experi-

(Concluded on page 208)

* Members of this Committee for 1949-1950 were: William S. Newell, '99, chairman, Frederick S. Blackall, Jr., '22, Richard W. Berry, '32, Eugene P. Worthen, '32, Rear Admiral David H. Clark, Victor M. Cutter, and Robert C. Lee.

BUSINESS IN MOTION

To our Colleagues in American Business ...

This is Revere's Sesqui-Centennial Year. One hundred and fifty years of increasing business success is something out of the ordinary, even though there are a few companies in other industries as old or even older. This company dates back to 1801, the year Paul Revere started the first copper mill in this country, in Canton, Massachusetts. People usually think of him as a great patriot; he was also an artist and craftsman whose copper engravings and silverware are museum pieces today. In addition, he was a businessman, realizing that he could prosper only by offering better products and improved service to government, industry and the public. In labor relations he probably was a pioneer, because he paid somewhat better than going wages, in order to enlist to the full the skills his business required. Few men of his time could equal him in vision and resourcefulness.

A spirit of inquiry, investigation, research, was one of his characteristics. Writing of his efforts to find how to work copper, he reports: "I determined if possible to find the Secret & have the pleasure to say, after a great many trials and considerable expense I gained it." His eldest son, Joseph Warren Revere, who succeeded him upon his death in 1818, went abroad in 1804 to increase his knowledge by visiting the European copper fabricators. This was in all probability the beginning of research by any copper and brass company in this country. In addition, the Revere mill continued to make independent investigations. As a result, Revere became known not only as the preferred American source of copper and copper alloys, but of information about them. This was so outstandingly the case that when one of Paul Revere's friends, Levi Hollingsworth, saw a need for a copper and brass mill in Baltimore he asked Revere for advice, and was given it in full generos-

ity. It is interesting to note that years later the Hollingsworth mill in Baltimore became the nucleus of the present Revere operations in that city.

When you consider Paul Revere's remarkable combination of art, skill, business acumen, recognition of the importance of research, it becomes possible to understand how a business so firmly founded could come down to today, larger than he ever imagined, and in proportion to the size of the country, just as important as it was in his own day. He was one of a number of men who put the United States on the path to greatness, not only politically but industrially.



As we look about the present Revere organization we find close links with the past, complete contact with the present, and great future promise. We are not only in copper and its alloys, but have been in aluminum alloys since 1922. More recently, we began to make Revere Ware, copper-clad stainless steel cooking utensils, now serving in American homes everywhere. Applied research, working as did Paul Revere but with greatly improved methods, continually uncovers new pros-

pects for the future. In personnel, it has always been a Revere principle to give enthusiastic aggressive and capable youth its chance as well as its training. Thus we are old and experienced, but ever new and imaginative. In this our Sesqui-Centennial Year we give tribute not only to those who have helped us grow since 1801, but also promise a continually increasing measure of future service.

And while we mark our 150th Anniversary we do not forget that the brass and copper industry, now including a number of venerable and honorable companies, joins with us in playing a vital part in American life. We are proud not only of ourselves, but of our entire industry.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801



Executive Offices:

230 Park Avenue, New York 17, N. Y.

ence during their undergraduate training was also regarded as a very worth-while objective and was also highly recommended. The Committee was pleased to learn that a laboratory for the study of the structural problems peculiar to ships is being considered in the Department. In ship structures, the relatively heavy plating, rather than the frame, presents unusual problems not found in usual shore structures nor, heretofore, in airplane frames. Thus the proposed laboratory offers the Institute an excellent opportunity to conduct significant studies in a most promising field. Although no specific proposals or recommendations for the laboratory were ready to be discussed, the Committee wishes to offer every encouragement to the early culmination of this proposed educational facility.

The continued progress in the development of the collections of comparative ship models in the Hart Nautical Museum was noted with interest. The Committee renewed its strong recommendation of last year that the half bay just to the north of the entrance to the museum be returned to the Department. Return of this space would greatly enhance the appearance of the museum as well as the entrance to Building 5. It would also provide much needed space for two large exhibit cases already on hand for which no proper space is now available. The transfer of these two exhibit cases to the museum proper would also

make possible a display of models showing the evolution of steamships, corresponding to the present series of models showing the evolution of ocean-going sailing vessels.

The Committee was pleased to observe the spirit of helpful co-operation mingled with critical evaluation of the curricula on the part of the Department's staff. This is undoubtedly an important factor in the rising interest and imagination of the students. It is also gratifying to note that the placement record of the students of this Department continues to be excellent.

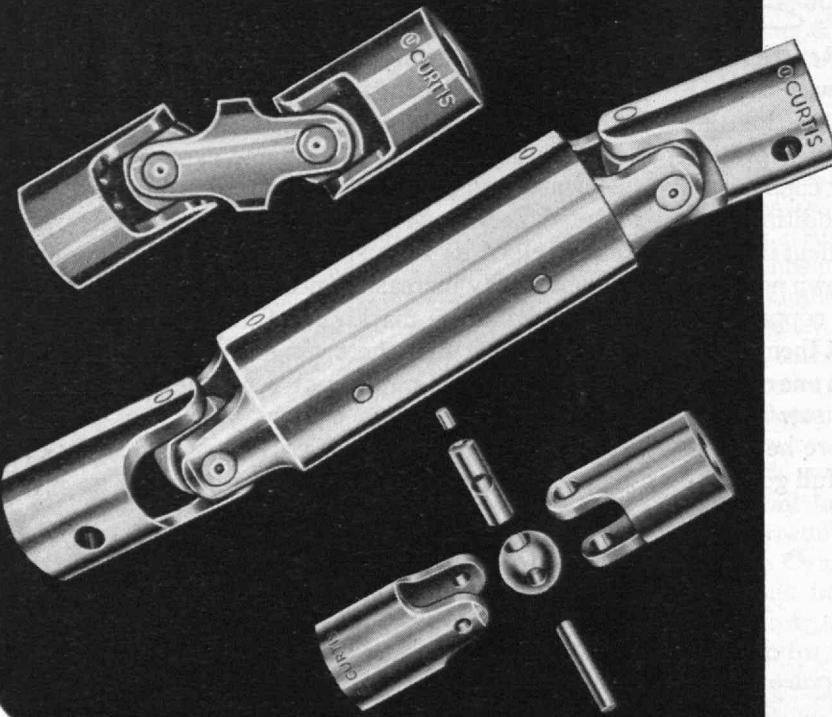
Housing and Defense

THE relationship of housing and the housing industry to the nation's defense mobilization was the subject of a conference on "Housing: A National Security Resource" at M.I.T. on January 19 and 20.

The two-day meeting, to which top-level government and industrial officials were invited, was sponsored by the M.I.T. School of Architecture and Planning and the Bemis Foundation; with the assistance of the Departments of Economics and Social Science, Building Engineering and Construction, and Mechanical Engineering.

The conference was the culmination of a nearly full-time course in industrialized housing as a national resource. Because present-day housing is immobile, according to Carl Koch, Assistant Professor of Architecture, the decentralization of industry has been accompanied by serious housing problems. For security it is vital that labor's housing be decentralized.

1919 **CURTIS** 1951
EXCLUSIVELY A MANUFACTURER OF
UNIVERSAL JOINTS



- Ball type for light duty applications
- Standard — for heavy duty and
- Lo-Friction for special duty work
- 14 sizes in stock at all times and ready for sample or volume shipments. Stock sizes $\frac{3}{8}$ " thru 4" O.D.

Write us for information on other than stock sizes up to 6" O.D. and for other than ordinary applications and requirements. As exclusive manufacturer of Universal Joints, we specialize in design collaboration. We invite your inquiry — in detail.

For over a quarter of a century Curtis has pioneered in the manufacture of Universal Joints. Famous patented Curtis "firsts" include the first ball oiler, internal lubrication grooves, the "tell-tale" lock ring and the lo-friction center block.

Curtis Universal Joints are of top quality. They have to be—consistently so—for Curtis manufactures nothing else. The fact of the matter is Curtis Standards of Quality were adopted for the Class One Specifications of the Army Air Force in 1941.

Free engineering data sheets and
price list upon request.

CURTIS UNIVERSAL JOINT CO., Inc.

C 8 Birnie Avenue
SPRINGFIELD 7, MASSACHUSETTS

Salute to TAPline

AND THE MEN WHO CHANGED
THE WORLD OIL SUPPLY MAP

American engineers, working with the peoples of Saudi Arabia, Trans-Jordan, Syria and Lebanon, have thrown supply lines half way around the globe... conquered mud, sand and desolation... spanned 753 miles of desert with 30 and 31-inch pipeline to build a 3500-mile short cut to European refineries. Today, thanks

to Trans-Arabian Pipe Line Co.'s president Burt E. Hull and all those who joined in the job... the world's largest line is delivering 300,000 b/d of crude from Arabian American Oil Co.'s Saudi Arabian wells to the Mediterranean port of Sidon, Lebanon—releasing 65 tankers from the 10-day run around the Arabian peninsula.

Looking Westward to the Mediterranean Sea... at Sidon where Graver Construction Co. erected terminal tankage of nearly three million barrels.

96,000-barrel Tank...
erected at Turaif (Station 6)
by Graver Construction Co.

Pump House at Station 6, Turaif...
built by Graver Construction Co.

What Graver Did to Help Move Arabian Crude Closer to Europe

More than 100 Graver engineers with a host of Graver-trained Arab workmen built the entire facilities for Station 6, Turaif—including the pump house and installation of all machinery, erection of a 96,000-barrel tank, and housing and other accommodations for a complete town of 1,000 people. At the Sidon terminal Graver Construction Co. erected sixteen 180,000-barrel tanks.

GRAVER CONSTRUCTION CO.

332 S. MICHIGAN AVENUE, CHICAGO
NEW YORK • JERSEY CITY • HOUSTON

A DIVISION OF

GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, IND.

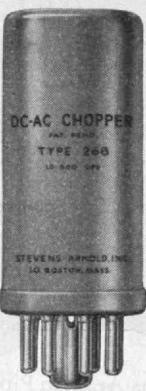


GRAVER

DC-AC CHOPPER

A model for every use — 60 and 400 cycles
Single pole and double pole — Make-before-break contacts — Contacts in air or in liquid

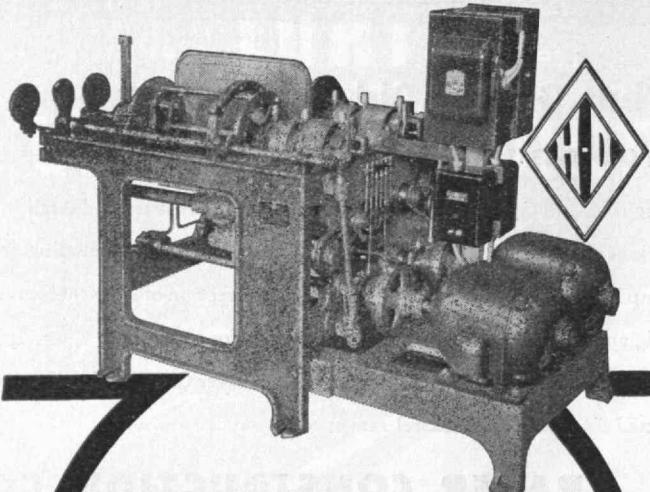
These Choppers convert low level DC into pulsating DC or AC, so that servo-mechanism error voltages and the output of thermocouples and strain gauges may be amplified by means of an AC rather than a DC amplifier. They are hermetically sealed, precision vibrators having special features which contribute to long life and low noise level.



WRITE FOR CATALOGS . . .
#246B, 60 cycles, AC
#280, 400 cycles, AC

STEVENS-ARNOLD
INCORPORATED

22 ELKINS STREET, SOUTH BOSTON 27, MASS.



FORMER-TWISTER — AN "H-D" CONTRIBUTION To The TWINE AND ELECTRICAL INDUSTRY

You may benefit by our eighty years experience in engineering and building standard and special machines for divers twisting operations. We make a complete line of twisters, formers, layers and ropers for the yarn, cord and rope industries; bunchers and stranders for the wire industries. If you process jute, manila, hemp, wire, thread, paper or synthetics, it will pay you to write for our specialized bulletins, today. Address Dept. T-1.

HASKELL-DAWES
MACHINE COMPANY, Inc.
2231 E. Ontario Street
PHILADELPHIA 34, PA.

STUDY IN SWEDEN (Continued from page 202)

tainly agree that they are well run now, and one is particularly impressed by the amount of electrification and the neatness of the stations; for instance, in Gothenburg and in many of the smaller towns, the station managers have planted flowers around and in the stations and made their buildings quite attractive.

Steel has not been nationalized. However, the government is building a steel plant in the Far North, at Luleå on the Gulf of Bothnia. The engineers regard the location as poor because of the distance from markets and because the port is closed for several months in the winter. It is, however, near the large iron ore deposits at Kiruna. This steel mill will have a capacity when finished of about 400,000 tons per year. The government is finding that this plant is proving to be very costly. At Domnarvet expansion costs about 50 crowns per metric ton (\$8.80 per short ton), but at Luleå it costs about 100 crowns per metric ton. The government has also had difficulty in obtaining skilled engineering personnel both because of the location near the Arctic Circle and because of the feeling among many of the engineers that they don't want the plant to be too successful and thereby lead to further government intervention in industry.

The Swedish people are rather proud of their co-operative movement. They hasten to state that co-operatives are not run by the government, are not monopolies, and must compete with private enterprises. Perhaps 4 per cent of the industrial enterprises are owned by co-operatives (95 per cent are privately owned). The big area where co-operatives flourish is not industry but retail trade of all kinds. The co-operatives have often sided with private enterprise against the government on questions of nationalization.

Communism has a relatively small following in Sweden. For instance, although the Social Democrats often found themselves in alliance with the Communists against a Conservative-Liberal coalition in parliament and in the Stockholm town council, they published very strong anticommunist literature in their last election campaign. The Communists lost quite heavily in this last election. There is no loyalty probe directed at Communists in Sweden of the type inspired by Senator Joseph R. McCarthy. As a matter of fact, several people well known to be Communists, are employed (as machinists and woodworkers) at the Aeronautical Research Institute where secret work is done for the Swedish Air Force.

The official Swedish policy is still neutrality but a good many people wonder if it will be possible to remain neutral if war should come. Military preparedness is on a high level and the feeling seems to be that Sweden would fight any invasion of her territory. Sympathies are almost entirely with the West but it does not seem that the people are ready to join in any military alliance such as the North Atlantic Pact.

Internationally, Sweden is as always, officially neutral, but almost all of the people are openly opposed to Communism and Russia. In the Finnish winter war of 1939, many Swedish people volunteered and went to Finland to fight the Russians. Nowadays public opinion

(Continued on page 212)

for temperature, pressure,
liquid level control . . .

Choose Klipfel valves

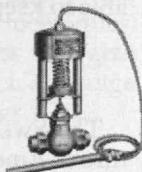
For dependability and economy . . . whether for plant equipment or manufactured products . . . specify Klipfel Valves . . . a wide range of standard types, as illustrated below, or controls designed specifically for you. If you have a control problem, discuss it with Klipfel Engineers. Write for the latest Klipfel Valve bulletins shown here. Each contains valuable, easy-to-use selection and specifying data. Address Dept. M-2.

Klipfel VALVES, INCORPORATED 

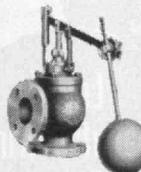
DIVISION OF HAMILTON-THOMAS CORPORATION, HAMILTON, OHIO



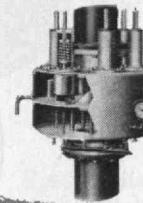
#148—Reducing
Valves



#449—Thermostatic
Valves



#349—Float Valves



#135M—Multiport
Back Pressure Valves



SAWYER CONSTRUCTION Co.

Builders

SLOAN LABORATORY

BUILDING No. 24

Biology and Food Technology Laboratory

12 M.E.V. LABORATORY

C. A. SAWYER, JR. '02

C. O. OLSON '36

M. B. CARTER

ROY W. JENKINS '50

Let **Barnstead**

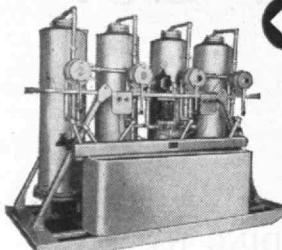
PURE WATER

Help You

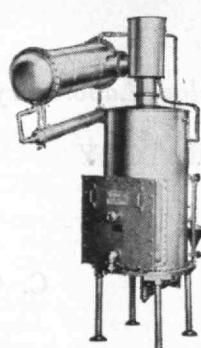
MANUFACTURING and Processing costs are *high* and getting *higher*. But by using Distilled or Demineralized Water, or *both*, you can *increase production, decrease rejects, lower manufacturing costs, and provide uniform product and process control* at all times.

But Pure Water requirements differ in *every* industry . . . and in *most* processes, for that matter. And since Barnstead makes *both* . . . Water Stills for Distilled Water and Demineralizers for demineralized water, you can be sure of the *correct* solution to your Pure Water problems by having a Barnstead Pure Water engineer make his recommendations. Write for Barnstead Pure Water Catalog #123.

DO IT WITH PURE WATER



Barnstead Demineralizers produce mineral-free water of far *higher* purity at *lower* cost with a *minimum* of maintenance. Whether you need 5 gallons an hour or 1000 . . . you'll find there's a Barnstead Demineralizer to fit your requirements and *save* you money.



For the production of *highest* quality, chemically *pure*, sterile water . . . For trouble-free, automatic operation . . . For distillate of unvarying consistency . . . Look to Barnstead. Since 1878, Barnstead Laboratory and Industrial Pure Water Stills have been the *proven standard* of the *Scientific and Industrial World*.

FIRST IN
PURE WATER
SINCE 1878

Barnstead
STILL & STERILIZER CO.

STUDY IN SWEDEN (Continued from page 210)

ion is probably more firmly set against the Russians than it was then. The press presents the news more impartially than does much of the American press but is strongly inclined toward the West. In recent months the Russians have not helped to promote friendship either. Since August there have been four incidents. Three of them involved alleged detention of a Lithuanian citizen by the Swedish authorities. Pravda and the Moscow radio have also begun to accuse Sweden of being unneutral and of being a tool of the Americans.

Recently one of the picture magazines came out with an article headed "Res Hem Hr Laritchev" ("Go Home Mr. Laritchev" — the Russian Naval attaché who was accused of spying). The article listed eight incidents since 1945 when members of the Russian Embassy were accused of spying. Other anti-Russian sentiments, although milder, have been expressed by almost everyone Mr. Randall has met. Many fear war in the near future; most feel that Sweden will be unable to keep out.

Swedish View of America

The Swedish people as a whole have a better picture of America and American life than do many other Europeans. Throughout Sweden one finds that many people have relatives in the United States with whom they are in fairly close contact. Through letters and visits they have been given a truer view of our life than is furnished by the movies. Though American films are widely circulated, the fantastic is recognized as such and not accepted as the truth. The newspapers devote considerable space to American news and descriptive articles. In one paper now, there is appearing a series of articles on television in the United States. There was a two- or three-page story recently in another paper about life in New York City. A full column, a few weeks ago, was devoted to Senator Robert A. Taft's campaign for re-election. These articles are furnished by Swedish correspondents in the United States or by co-operation with American newspapers. One good feature of the newspapers in the summer is that they all have a column of news in English — one column in one newspaper was complete with baseball scores and standings.

Mr. Randall reports that the people he has met have all been genuinely interested in the United States. All kinds of questions are put forward, and anyone coming to Sweden needs to have a full knowledge of our resources, geography, Constitution, the rights of the individual, social legislation, the operation of the Marshall Plan, our customs, and the general operation and attitude of our country and its people. An American is assumed automatically to know almost everything about America, and it has been difficult at times to come up with a good answer to some of the questions asked.

A strange fact to many is that in America one can move around the country at will and without having to tell anyone. That a foreigner is also quite free is even more astounding. In Sweden the citizens are reg-

istered both with the government and with the church (state controlled), and when they move to another town they must notify the authorities. A foreigner must register with the police everywhere he goes.

Swedish Students at M.I.T.

The M.I.T. Foreign Student Summer Project is widely known throughout university circles in Sweden. From the point of view of the Swedish students it has but one fault: that is the fact that only three Swedish students can come over to M.I.T. each summer. This has led to strenuous competition for the opportunities available. Those who have returned to Sweden from M.I.T. have written several articles about their experiences in the school newspapers, and this has no doubt helped stimulate interest.

Some Swedish students have inquired about the possibility of coming to America for a short while to do research work with a private company. Many of the young engineers are not as interested in further study as they are in getting a glimpse of the United States and American industry. They would like to do research work or other work of an instructive nature where they could observe the industrial techniques, production methods, and the other reasons that give American industry a high productivity. Such exchange occurs between various European countries.

Foreign Study and Research in Sweden

The Americans who come to Sweden are highly appreciated, both for the work they do and for the contact with America that is made through them. To say that one is from M.I.T. is to find an esteemed welcome and open door.

The M.I.T. students who spent the summer in Sweden believe there are many other possible opportunities for study in Sweden. A man interested in electric power problems, for example, should find advantages to study in that country. Sweden has always been interested in the generation of electric power and its transmission. A group of Swedish electrical engineers who returned recently from a trip to the United States expressed the opinion that Swedish engineering was equal to that found in America. Students of marine engineering should also be able to benefit from study in Sweden as it is one of the leading ship-building nations and has pioneered many innovations. Public health, biology, and paper chemistry might also offer unusual research possibilities.

In conclusion the visitors from M.I.T. believe that their summer experience was extremely valuable. In their professional fields they have learned to look at a number of problems from different points of view than the ones to which they were accustomed. They became acquainted with theoretical and experimental methods of attack entirely new to them. In some cases they were able to work outside their specialized fields at M.I.T. But above all they felt that they had become acquainted with a different way of life, and had learned how America is regarded from the outside. They believe that now they have a much better understanding of the problems involved in achieving a brotherhood of nations.

HEVI DUTY

Precision Electric Heat Treat Furnaces

(Laboratory and Industrial)

Dry Type 2 Air Cooled Transformers

(to 1000 KVA)

3 Constant Current Regulators (Static Type)

Hevi Duty Precision Electric Heat Treating furnaces are built in a large variety of types and sizes — for many heat treating operations — with temperature ranges to 2500° F (1371°C). They are standard production equipment in many national industrial plants.

2 Hevi Duty Dry Type Air Cooled Transformers with or without tap changing switches as well as special transformers for special requirements.

3 Hevi Duty Constant Current Regulator (Static Type) for series lighting. To transform constant potential to constant current, using a resonant circuit with patented exclusive features. A decided improvement over any other known type of regulator.

Write for descriptive bulletins.

Harold E. Koch '22 President

Elton E. Staples '26 District Mgr., Cleveland

HEVI DUTY ELECTRIC COMPANY

HEVI DUTY

HEAT TREATING FURNACES • ELECTRIC EXCLUSIVELY
DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN

OPERATIONS RESEARCH

(Continued from page 194)

which are in short supply. The whole problem of planning a combined production, storage, and sales operation involves many aspects of probability and game theory, and usually requires a sequence of hypothesis and trial before it is possible to design the operation so as to be most efficient.

An interesting example of an application of game theory turned up in the analysis of the ability of our strategic bombing airplanes to survive attack by enemy jet fighters. This analysis was carried out last year by the operations research group attached to the Joint Chiefs of Staff. Data from all possible sources were used. Data on vulnerability of airplanes were combined with data on accuracy of fire for various assumed tactics of the fighter and bomber, to obtain the probability that the bomber would be shot down on a single pass of the fighter against it. Calculations were made for a variety of altitudes and speeds, for different angles of approach of the fighter, and for different armament. In some cases, for example, when the bomber fires back at the fighter, there is a chance that the fighter will be destroyed before its own shots take effect. The effect of this probability on the outcome of the duel was included in the studies, using the techniques of game theory.

As the study went forward, certain optimum tactics for both fighter and bomber became apparent. These tactics were then checked against actual tactics employed as a continuing check on the realism of the calculations. In addition, the probable results of bomber-fighter duels for World War II conditions were also worked out and were checked against World War II data. We now have data from both sides on German-United States bomber-fighter duels in World War II. The comparison of our calculations with these data shows how important it is to take all aspects of the problem into account before the final result is arrived at.

The first theoretical results of our calculations of the duel between the B-17 and the German fighter were of course equivalent to results which could be obtained in proving-ground runs, with none of the complications of actual combat involved. Probabilities of about 45 per cent that the bomber would be shot down in one pass of the fighter against it were given. The gunfire accuracies used checked the very voluminous German gun-camera data, which we have obtained on this type of duel. However, the same German data showed that operational results in actual combat gave a markedly different picture from proving-ground results, in that gross errors were present. In many passes by the fighter, the aim never steadied on the bomber at all. Because of nervousness of the fighter pilot or other influences, many runs occurred in actual combat where the fighter guns never actually got pointed at the bomber, and the shots fired were wasted. In fact, according to the German battle data, in only one-third of the passes by German fighters did the gun sights actually steady on the bomber target. In these cases, the proving-ground results, predicted by the calculations, turned out to hold for

(Continued on page 216)



M.I.T. RANKS HIGH IN ROGERS PEET LISTS

M.I.T. men constitute an important group in Rogers Peet's large clientele of University Alumni. Our Boston Store, of course, gives them a convenient opportunity of making our acquaintance as undergraduates . . . but it is more than mere convenience that holds their patronage over the years.

As Makers-and-Merchants-in-one, we ourselves tailor Rogers Peet Clothes in our own workrooms. This means not only that we control every detail we put into them . . . but that we can consistently offer unusual value.

In addition to our own New York and Boston stores . . . Rogers Peet Clothes may be purchased in other good stores which we carefully select from coast to coast.

*Rogers Peet
Company
Makers of fine clothes*

In New York:
Fifth Avenue
at 41st Street

Thirteenth St.
at Broadway

Warren Street
at Broadway

And in Boston:
Tremont St.
at Bromfield St.

A Revocable Living Trust

"BETTER THAN A WILL!"

THREE PURPOSES

By the creation of a revocable living trust which you may change at any time, you accomplish three principal things:

1. You establish a plan for distributing the trust property at your death.
2. You provide for its present care and management by an experienced trustee.
3. You insure that the property will be protected and will be easily available for your care even in the event of illness or incapacity.

Specifically, you may:

Save Settlement Costs and Publicity

Through a revocable living trust your property can be distributed at death to your beneficiaries without the delay, publicity, and expense usually connected with the settlement of an estate when left by will or according to the laws of descent.

Provide Lasting Protection for Dependents

Through a revocable living trust you can provide lasting future protection for your husband or wife, your children and grandchildren — the living and the yet unborn.

Be Relieved of Management Details

You can delegate to the trustee the responsibility of caring for your securities, subject to your approval if you wish. The property will always be under the supervision of an experienced investment staff. Should you be ill or travel extensively there would be no interruption in the management of the securities in the trust, or in the availability of the money for paying your expenses.

Retain Control

You may appoint The New England Trust Company sole trustee or act with us as co-trustee. You should keep the right to amend or revoke the trust, to withdraw property and to change trustees.

See Your Estate Plan in Operation

You can see your estate plan in operation now — during your lifetime. In this way you are able to measure the qualifications and effectiveness of your trustee. You may change your plans to meet changing family situations at any time by revising the trust agreement.

Save Taxes

Through a revocable living trust you may take advantage of opportunities for saving taxes just as easily as under any other form of property distribution.

We shall be glad to discuss with you and your attorney the manner in which these advantages can operate for you and your beneficiaries through a revocable living trust at The New England Trust Company.

The **New England Trust Company**

135 DEVONSHIRE STREET

At the Corner of Milk Street

BACK BAY BRANCH : : 99 NEWBURY STREET

Boston, Mass.



Member Federal Reserve System



KNOW

HOW!

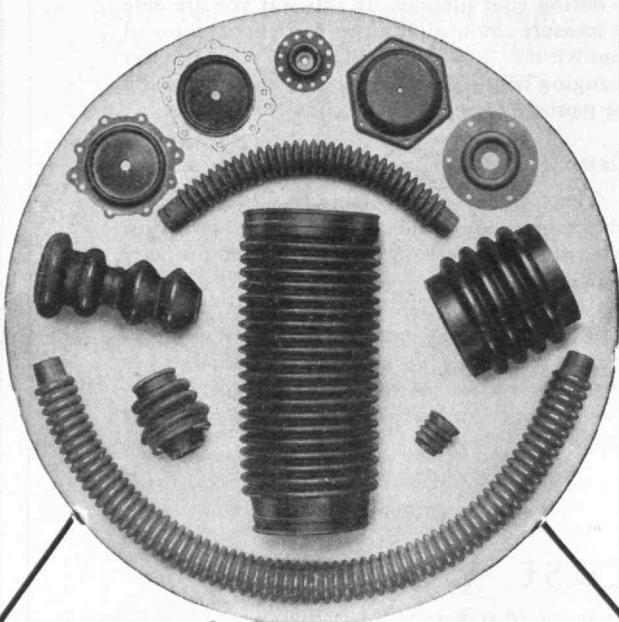
Diefendorf has long had the "know how" in gear design and production. And, too—Diefendorf knows how to work with your designers and engineers on gear production problems for military or civilian requirements.

DIEFENDORF GEAR

CORPORATION

Syracuse, New York

DIEFENDORF GEARS



BOOTS and DIAPHRAGMS

Acushnet precision molded boots and bellows of special rubber stocks provide sustained flexibility at extremely high or low temperatures, with high resistance to various fluids and gases. DIAPHRAGMS of all sizes accurately produced, with or without fabric insert, exact to specifications. All products are made to order, and not stocked.

Acushnet
PROCESS COMPANY
NEW BEDFORD, MASS., U. S. A.

Address all Correspondence to 774 Belleville Ave., New Bedford, Mass.

OPERATIONS RESEARCH

(Continued from page 214)

actual combat with about the predicted accuracy and the predicted losses per pass. In the other two-thirds of the cases, practically no hits were obtained and the runs were a complete loss as far as the fighter was concerned. Consequently in the case of World War II bomber-fighter duels, the operational figures on the probability of shooting down the bomber by a fighter in a single pass turned out to be one-third of the proving-ground results.

Thus corrected for gross errors, our theoretical calculations predicted approximately a 15 per cent probability of shooting down the B-17 on a single pass by a German fighter, which checked remarkably well with actual data on the air battle over Germany. Such a detailed check with operational results for World War II gave us confidence in our predictions on future battles as long as we took into account the operational, gross-error factor which must be added to theoretical proving-ground results. It also showed that reduction of gross errors, by training perhaps, would pay off at least twice as well as reduction of gun-sight errors.

Career Opportunities

Perhaps enough has been said by now to indicate that operations research is a field of applied science with career possibilities for scientists and engineers having an interest in applying their scientific training and research ability to practical affairs. More examples have been given of its successes in military operations than in other fields because the writer's experience has been largely in this field and also because, in the present state of the world, the military applications are of crucial importance. There are a number of interesting developments in nonmilitary applications, however. A Committee on Operations Research has recently been set up in the National Research Council to foster training in this field and to help extend activities to other governmental and commercial activities. A well-known firm of industrial consultants is already successfully applying the techniques to business and industry. Enough has been done to show the opportunities for successful careers.

But at present the military applications loom largest. Each of the services has recognized the great importance of the technique. There are now five operations research groups devoting full time to military problems: the Operations Evaluation Group of the Navy; the Operations Analysis Section and Project

GEORGE W. McCREERY CO.

Building Construction

126 NEWBURY STREET

BOSTON, MASS.

Rand, both working for the Air Force; the Operations Research Office of the Army; and the Weapons Systems Evaluation Group, attached to the Office of the Secretary of Defense and to the Joint Chiefs of Staff. Each of these groups is attached to a high echelon in the military staff. Each has scientists in Washington and in the field where military action is taking place (in Korea, for example), working on problems of fundamental importance. Each group is in urgent need of more scientists to carry out its increased responsibilities. Any scientist or engineer who is considering volunteering to help in the present emergency would do well to consider these opportunities for service.

If we are to survive in this present world, the free nations must make brains take the place of more men. Man power has always been valued more highly by occidental nations than has been the case in oriental countries and, by their very nature, democracies cannot be blind to the loss of their man power. Of equal importance, of course, is the husbanding of other resources of the nation, and the exercise of care that in time of real need these are used most efficiently and with greatest effectiveness against our enemies. Operations research provides an opportunity for scientists to contribute to a more effective use of our resources of men and material, while at the same time carrying on research of scientific importance in applied science. The study of operations research has the further advantage of offering career opportunities in industry, either in war or in peace, which could have pronounced influence on the management of industrial operations.

LEONARD CONSTRUCTION COMPANY

Engineers and Contractors

SINCE 1905

IN THE AMERICAS AND FAR EAST

37 South Wabash Ave.

Chicago

THE MURRAY PRINTING COMPANY

A Complete Printing Organization
Letterpress - Offset - Binding
Specializing in Book Reproduction

Wakefield • Massachusetts

LICENSING ARRANGEMENTS WANTED

We wish to acquire patent rights on electrical components, instruments, or accessories used in the following fields:

RADIO, RADAR, OR TELEVISION. TELEPHONE,
TELEGRAPH, TELETYPE, OR SOUND
ON FILM, PUBLIC UTILITIES, AIRCRAFT.

Our preference is for items that have limited rather than mass markets. We have a particular interest in switches and relays, also in telephone parts and accessories.

All replies to be held confidential. Please write to Box G
Technology Review.

SA-3

SCULLY SIGNAL COMPANY

VENTALARM®

Tank Fill Signal

SAFER FILLING — NO SPILLING

"FILL TIL' THE WHISTLE STOPS"

F. P. Scully '15

88 First Street, Cambridge 41, Mass.

UNiversity 4-2900



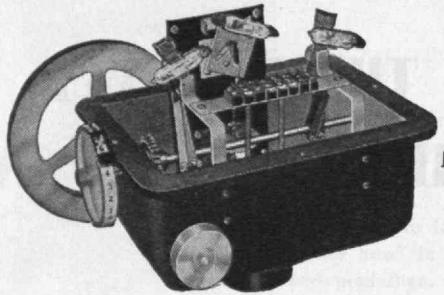
PRECISION-GAUGED
HAIRSPRINGS
AND
FINE ROLLED WIRE

PRECISION PRODUCTS COMPANY

WALTHAM, MASSACHUSETTS

ROBERT I. BRADLEY, '20

Put that **Second Pump** to Work!



RF-2

A 2-PUMP RF-2 ROTO-TROL with a built-in alternator will operate each pump on alternate starting cycles and will operate both pumps if the demand requires.

This Roto-Trol is furnished in a Cast Iron cabinet. It is float operated through stainless steel tape. Also available in from two to eight circuits for sequence control.

DEPTH INDICATOR IS
OPTIONAL — EXTRA

Write for full Data

Water Level Controls Division of

Healy-Ruff Company

711 HAMPDEN AVE., ST. PAUL 4, MINN.

AUTOMOBILE SAFETY

(Concluded from page 196)

makes his chances of survival very much less. This applies both to the front, and rear seats, and many casualties result when rear-seat cushions and springs jump from their moorings and inflict serious injury upon occupants. Harper points out that proper seat fastenings are not difficult to engineer. It is simply that nothing has been done to change their design and make them less dangerous.

Automobile door fastenings are similarly at fault. Well over half the deaths and injuries to front-seat passengers result when the person is thrown into the street — there to be crushed by passing traffic or killed by fracture of the skull. Harper believes that removal of this danger is simply a matter of designing proper door fastenings so that they will withstand a side thrust of at least 10G.

Harper cites thousands of accidents caused when cars go into spins as the result of sideswiping or oblique collision. A large proportion of these mishaps are initiated by ornamental bumper guards, which readily hook each other and set up violent skids. The same thing is true of fenders which break the smooth line of the automobile body. All cars, according to Harper, should be completely smooth on the outside, with recessed bumper guards, fenders faired into the body, and even sunken door handles.

Harper sees no hope for the pedestrian until traffic laws governing him become more stringent. Pedestrians do not realize that the momentum of a car weighing 3,500 pounds, which is traveling at 25 miles per hour, is over 70,000 foot-pounds, or that its probable stopping distance, allowing for a one-second delay for the driver to react, is nearly 80 feet. Thus, people step into the street assuming that an oncoming car can always stop. The situation is made worse in many cities where pedestrians have the right of way the moment they step onto crosswalks. The result is a steady toll of death and injury. The only cure for it, in Harper's opinion, is the traffic light; or, where that is not practicable, the substitution of the principle that pedestrians must cross streets at their own risk.

One important improvement in pedestrian protection, Harper believes, would be to outlaw the ornaments which today adorn almost every make of car. Especially deadly are the sharp-pointed radiator gadgets that give the driver a sense of power and swift freedom. Many of these resemble artillery shells and tomahawks. But when a pedestrian is struck and thrown onto the hood of the car, the ornament very frequently turns injury into death by disemboweling him. Children are particularly endangered by ornaments, since these are at the level of their heads. Many a child has had his skull split open by the equivalent of a 20-millimeter shell traveling with many times the momentum of an actual shell fired from a gun.

Harper looks forward to the day when public demand will bring about the few minor engineering changes that will make cars relatively safe for riders and for pedestrians. The amazing thing is, he points out, that the automobile industry has reached the half-century mark without appreciating the importance of applying simple physical laws to control accidents.

A BETTER FORK TRUCK

5, 7½, 10 Ton Cap.
Bulletin No. 76

Agents in
Principal Cities
Responsible Distributors
Invited to Inquire

Made by Mfrs. of **KRANE-KAR**
The Pioneer Manufacturers of HEAVY DUTY
Industrial Materials Handling Equipment

SILENT HOIST & CRANE CO.

891 63rd Street, Brooklyn 20, New York

J. C. CORRIGAN CO., INC.

Conveyors

Engineers • Manufacturers • Erectors
 Coal Handling Systems
 Materials Handling Equipment
 Portable Conveyors

Distributors for

Jeffrey Manufacturing Co.
 Jeffrey Parts Carried in Boston Stock

41 Norwood Street, Boston 22, Mass.
 Tel. GEneva 6-0800

William H. Coburn, '11

William F. Dean, '17

William H. Coburn & Co.

INVESTMENT COUNSEL

68 Devonshire St.

Boston, Mass.

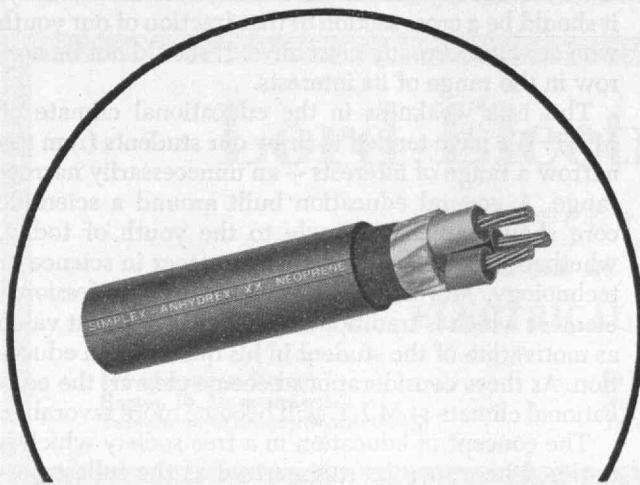


FLIGHT TEST and CONTROL INSTRUMENTATION

GYROSCOPICS—ELECTRONICS—SERVOMECHANISMS

DESIGN • DEVELOPMENT • PRODUCTION

56 ELMWOOD STREET, NEWTON 58, MASSACHUSETTS



SIMPLEX

Anhydrex XX
CABLES

High-voltage cables that assure uninterrupted service at 2,000 - 17,000 volts operation in underground, duct, or aerial installations.

Insulated with ANHYDREX XX; first high-voltage insulation combining all the properties necessary for trouble-free operation when exposed to water or moisture, heat, ozone and other deteriorating agents.

Jacketed with neoprene to provide steadfast protection against rough handling, soil acids and alkalies, oils, grease, chemicals and flame.

SIMPLEX WIRE & CABLE COMPANY
 79 Sidney Street, Cambridge 39, Mass.

SAVINGS FLOW FROM
SPEED-LAY PIPE SYSTEM
 EVERYTHING for a COMPLETE PORTABLE PIPE SYSTEM

FACTORY PACKAGED

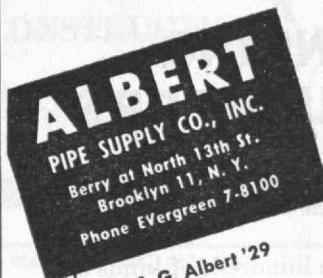
PIPE—COUPLINGS

FITTINGS—VALVES

ACCESSORIES

LIGHTWEIGHT, SAVES LABOR

FAST, SIMPLE



S. G. Albert '29



DELIVERED
 READY FOR INSTALLATION

Immediate Installation
 by one unskilled man.
 2½ to 12½ o. d. black
 or galvanized. Larger
 sizes can be furnished.
 Ready to lay—without
 delay.

SEND COUPON NOW!

ALBERT PIPE SUPPLY CO., INC.
 Berry & N. 13th St. Brooklyn II, N.Y.

Please send free booklet describ-
 ing your Speed-Lay Pipe System
 and services:

NAME.....
 FIRM NAME.....
 ADDRESS.....
 CITY..... STATE.....

If You Need Additional Manufacturing Capacity

CALL IN

LIQUID's

CONTRACT MANUFACTURING DIVISION

◆ Capacity and manpower available on Machine Shop, Sheet Metal and Woodworking facilities for industrial or defense contracts.

Write for illustrated booklet "Special Contract Department" which lists and describes facilities.



Contract Manufacturing Division

THE LIQUID CARBONIC CORPORATION
3100 South Kedzie Ave. Chicago 23, Illinois
Manufacturers of Brewing and Bottling Machinery, Soda Fountains, Gas Weld Equipment, CO₂ Gas, Dry Ice, Oxygen and Medical Gases



PLANNING HEADQUARTERS

For The World Of
Braided Cotton Cord and Line

We manufacture hundreds of kinds of braided cotton cord in all colors and sizes up to one inch in diameter — plus many kinds of plastic cords. We also make many varieties of special items — wire centered and waterproofed cords, nylon, rayon cords and practically every other type you might need.

You are cordially invited to consult us on any cordage problem.

Samson CORDAGE WORKS
BOSTON 10, MASS.

EDUCATION FOR FREEDOM

(Continued from page 195)

The most elaborate and complete college catalogue is no guarantee that education will be the product of four years of attendance. Education is not something which is imparted to a student by an instructor. It is something which happens within the student himself in response to his own efforts. Lest someone should now jump to the conclusion that professors are superfluous, the writer hastens to add that the function of the instructor is inspirational.

Education, therefore, is a product of a relation between the student and other individuals. The high purpose of the university or college is to provide the intellectual environment which will inspire the student to the effort toward education. The environment must include, of course, professors: but the professors should be more than teachers from textbooks. They should be — whether scientists, engineers, or philosophers — men who in themselves exemplify the spirit of free inquiry and the sense of responsibility.

The school has another duty of comparable importance. Even a college professor must admit, however reluctantly, that much of the inspiration the student finds at college comes from his fellow students. In the good college, the desire for education wells up from within the student body itself. It would seem, therefore, that the college must select its student body with a care commensurate with that it uses in selecting its staff. By this I do not mean that the freshman class should consist only of the more erudite or the socially more fortunate youth of the country. On the contrary, it should be a cross section of that fraction of our youth who are intellectually most alive. It should not be narrow in the range of its interests.

This is a weakness in the educational climate of M.I.T. We have tended to draw our students from too narrow a range of interests — an unnecessarily narrow range. A general education built around a scientific core should appeal strongly to the youth of today, whether or not he is headed for a career in science or technology. Moreover, the vocational or professional element which is traditional at M.I.T. is of great value as motivation of the student in his quest for an education. As these considerations become clearer, the educational climate at M.I.T. will become more favorable.

The concept of education in a free society which is outlined here may be summarized as the fullest pos-
(Concluded on page 222)



FRICTION FIGHTER

(Flyweight Division) MPB miniature ball bearings provide the answer to problems with new designs concerning space-weight-friction. Smallest in size, foremost in rugged performance. Install and forget.

Over 70 different types and sizes from .100" to 5/16" o.d. Complete engineering service — full specifications in our new catalog. Write or wire for TR51, no obligation.

MINIATURE Precision BEARINGS
Incorporated

KEENE, NEW HAMPSHIRE, U. S. A.

SYSKA & HENNESSY, INC.

Engineers

Consultation Plans Reports
Power Plant Water Systems Disposal Plants
Air Conditioning Systems
NEW YORK, N.Y.

J. F. HENNESSY '24

HOLMES & NARVER INCORPORATED ENGINEERS

DESIGN—CONSTRUCTION—MANAGEMENT

JAMES T. HOLMES
M. I. T. '14

824 S. Figueroa St.

D. LEE NARVER
STANFORD '14

Los Angeles 17, Cal.

TRinity 8201

JAMES F. DOWNEY & STAFF INDUSTRIAL ENGINEERS

WORK LOADS, JOB CLASSIFICATION,
EQUIPMENT UTILIZATION,
PLANT LAYOUT, PRODUCTION CONTROL
LABOR RELATIONS

20 NORTH BROADWAY
WHITE PLAINS, N. Y.

James F. Downey, '20

SOUTHERN OFFICE:
GREENSBORO, N. C.

N. A. LOUGEE & COMPANY ENGINEERS AND CONSULTANTS

Reports—Appraisals—Depreciation Studies
Rate Cases—Business and Economic Studies

120 BROADWAY

N. A. LOUGEE '11
J. W. McDONALD, JR. '20

NEW YORK 5, N.Y.

L. A. MATTHEWS '13
B. F. THOMAS, JR. '13

EDUCATION FOR FREEDOM

(Concluded from page 220)

sible intellectual development of the individual. In one sense this is a proposal for exploration, in that even in the democratic countries this objective is still a very remote one. Nevertheless, it has been the tacit objective of the American tradition in education. It has come down to us through Emerson, Thoreau, and William James. More recently it has been referred to by John Erskine as "the moral obligation to be intelligent." We find it in the words of Alfred North Whitehead: "where attainable knowledge would have changed the issue, ignorance has the guilt of vice." And, again, from Mark Van Doren: "democracy depends for its life upon the chance that every man will make all the judgments he can . . . democracy's only authority is reason, its only strength criticism."

It is fitting to conclude with the words of a great contemporary spokesman for the American tradition in education, John Dewey: * "Fidelity to the nature to which we belong, as parts however weak, demands that we cherish our desires and ideals until we have converted them into intelligence, revised them in terms of the ways and means that nature makes possible. When we have used our thought to its utmost and have thrown into the moving unbalanced balance of things our puny strength, we know that though the universe slay us still we may trust, for our lot is one with whatever is good in existence. We know that such thought and effort is one condition of the coming into existence of the better. As far as we are concerned it is the only condition, for it alone is in our power. . . . To ask in good faith as much as this from ourselves is to stir into motion every capacity of imagination, and to exact from action every skill and bravery."

*John Dewey, *Philosopher of Science and Freedom*; a symposium edited by Sidney Hook, page 37 (New York: The Dial Press, 1950), \$3.50.

CHARLES N. DEBES AND ASSOCIATES

Engineers and Consultants

Plans, Specifications, Construction Supervision
Industrial Plant and Commercial Projects
Electrical—Mechanical—Sanitary—Structural

ROCKFORD TRUST BLDG. ROCKFORD, ILL.
C. N. DEBES '35

PREPARATORY SCHOOLS FOR BOYS

CHAUNCY HALL SCHOOL

Founded 1828. The School that specializes in the preparation
of students for the Massachusetts Institute of Technology.

Ray D. Farnsworth, Principal 533 Boylston Street, Boston, Mass.

HUNTINGTON SCHOOL FOR BOYS

Grades Nine to Twelve.
Thorough preparation of entrance to M.I.T.
and other technical schools.
Regular and summer courses.
William G. Wilkinson, Headmaster

320 Huntington Ave., Boston

Tel. Kenmore 1800

PROFESSIONAL CARDS

JACKSON & MORELAND *Engineers and Consultants*

Design and Supervision of Construction Reports — Examinations — Appraisals Machine Design — Technical Publications

BOSTON

NEW YORK

DRUMMEY-DUFFILL, INC. *Architects—Engineers*

80 Boylston Street
Boston 16, Mass.

W.M. W. DRUMMEY, '16, B.S., M.A., A.I.A. HUGH P. DUFFILL, '28, S.B., S.M., M., Am. Soc. C.E.

EADIE, FREUND AND CAMPBELL *CONSULTING ENGINEERS*

500 FIFTH AVENUE NEW YORK 18, N. Y.
Mechanical — Electrical — Sanitary
Air Conditioning — Power — Process Layouts
J. K. Campbell, M.I.T. '11

STARKWEATHER ENGINEERING CO. *INCORPORATED*

Engineers and Contractors for Pumping Plants
Boiler and Power Plants, Cooling Water
and Heat Recovery Systems
246 Walnut Street, Newtonville BIGelow 8042
J. B. Starkweather, B.S. M.I.T. '21

THE KULJIAN CORPORATION 1200 North Broad St., Philadelphia 21, Pa. CONSULTANTS—ENGINEERS—CONSTRUCTORS Specialists in UTILITY, INDUSTRIAL, AND CHEMICAL FIELDS

Offices in
Washington, D.C.—St. Petersburg, Fla.—Rome, Italy
Calcutta, India—Caracas, Venezuela
H. A. KULJIAN, '19 A. H. KULJIAN, '43

FABRIC RESEARCH LABORATORIES *INCORPORATED*

Research, Development and Consultation
for Textile and Allied Industries

665 Boylston Street Boston, Mass.
W. J. HAMBURGER, '21 K. R. Fox, '40 E. R. KASWELL, '39

GILBERT ASSOCIATES, INC. *ENGINEERS AND CONSULTANTS*

Malcolm G. Davis '25, Vice President Allen W. Reid '12 E. C. Edgar '35
Steam, Hydro, Diesel Power Plants; Industrial Structures;
Plant Safety, Labor Relations, Utility Rates, Valuations,
Reports; Large Scale Purchasing; Industrial Laboratory
New York, N. Y. Reading, Pa. Washington, D. C.
Philadelphia, Pa. Houston, Tex.

FAY, SPOFFORD & THORNDIKE *Engineers*

Airports — Bridges — Water Supply and Sewerage
Port and Terminal Works — Fire Prevention

INVESTIGATIONS SUPERVISION OF CONSTRUCTION DESIGNS

Boston

New York

CLEVERDON, VARNEY & PIKE

Consulting Engineers

HERBERT S. CLEVERDON '10 WALDO F. PIKE '15
LAWRENCE J. TRACY '23

Structural Designs Foundations
Heating Ventilating and Plumbing Designs
Industrial Buildings, Reports, Investigations

120 TREMONT STREET BOSTON 8, MASS.

MAURICE A. REIDY *Consulting Engineer*

BRIDGES BUILDINGS
STRUCTURAL DESIGNS FOUNDATIONS
CONSTRUCTION CONSULTANT AND ARCHITECTURAL ENGINEER

Estimates and Appraisals

101 TREMONT STREET BOSTON, MASS.

SERVO CORPORATION OF AMERICA

Henry Blackstone '37, President

*Consultants on
Electronic Control Problems
for Industry*

New Hyde Park

Long Island, N.Y.

MORAN, PROCTOR, FREEMAN & MUESER *CONSULTING ENGINEERS*

Foundations for Buildings, Bridges and Dams;
Tunnels, Bulkheads, Marine Structures, Soil Studies and
Tests; Reports, Design and Supervision

Pardo, Proctor, Freeman & Mueser
Ingenieros Consultores
Ap. Correos 614, Caracas, Venezuela

WILLIAM H. MUESER '22

WILLIAM W. RUSSELL '22

EDGAR P. PALMER '25

PALMER RUSSELL CO., *Realtors*
1320 Beacon Street Brookline 46, Massachusetts

COMPLETE MORTGAGE SERVICE

Business Loans to Corporations and Institutions
Loan Correspondent for the Penn Mutual Life Insurance Company

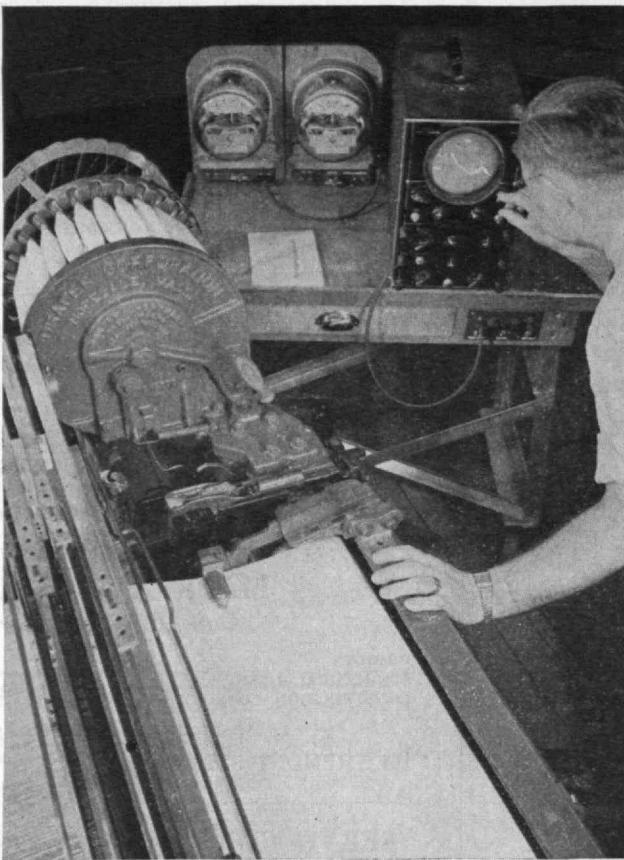
Braintree 2-2933

Hingham 6-2360

FRANK MASSA
Electro-Acoustic Consultant

99 Cedar Street
Braintree, Massachusetts

5 Fottler Road
Hingham, Massachusetts



The oscilloscope and oscillograph are used by Draper engineers to resolve the important functions of loom mechanisms. Valuable information is gathered from instantaneous power consumption curves and stress analysis curves. The sequence of events is determined to the smallest fraction of a second. Trial and error methods are eliminated when these two important research instruments are used to explore the all-important subject of loom timing.

This is just another phase of Draper research. Our customers must be given better and better looms and mechanisms to combat the ever-narrowing margin of profit. Draper engineers are making this possible through the most intensive research.

A Draper product is a proven product

*Loom
Research*



**OSCILLOGRAPH
RECORDER**

DRAPER CORPORATION

Atlanta, Ga.

Hopedale, Massachusetts

Spartanburg, S.C.



Alumni AND Officers IN THE News

Executive Elevation

LAWRENCE B. RICHARDSON'21 has been elected president of the Institute of the Aeronautical Sciences for the year 1951.

EDWARD J. HANLEY'24, formerly Executive Vice-president of the Allegheny-Ludlum Steel Corporation, has been elected to the presidency of that firm.

FOSTER N. PERRY'24 has been made executive vice-president of the American Bosch Corporation.

ROBERT M. KIMBALL'33 has been appointed director of the newly established Division of Business Administration at the Institute, effective January 1.

Authors Acclaimed

EDITH CLARKE'19 is author of a volume, *Circuit Analysis of Alternating Current Power Systems, Volume II*, published by John Wiley and Sons, Inc.

GORDON S. BROWN'31 and DONALD P. CAMPBELL'43 have collaborated on a book, *Principles of Servomechanisms*, published by John Wiley and Sons, Inc.

A Portuguese translation of *A Short History of Science* by HARRY W. TYLER'84, ROBERT P. BIGELOW, Professor Emeritus, and William Thompson Sedgwick, former staff, has been published by Editôra Globo, Pôrto Alegre, Brazil, as volume 5 of the series, *Fundo de Cultura Geral*.

PHILIP M. MORSE, staff, has collaborated with George E. Kimball of Columbia University in writing a Technology Press book, *Methods of Operations Research*, which John Wiley and Sons, Inc., have scheduled for publication in January.

Platform Patter

GEORGE W. GILMAN'23 spoke on "Transcontinental Radio Relay - 1951" at Harvard University before the Boston section of the Institute of Radio Engineers on January 18.

AUGUST L. HESSELSCHWERDT, JR.'31, addressed the Boston section of the American Society of Refrigerating Engineers on the topic, "Refrigeration and Solar Energy."

WILLIAM D. ROBERTSON'42 addressed the Connecticut section of the American Institute of Mining and Metallurgical Engineers at Yale, and spoke on "Molybdate and Tungstate as Corrosion Inhibitors and the Mechanism of Inhibition."

Merit Merited

HENRY HOWARD'89 has been awarded the Perkins Medal for 1951 by the Society of Chemical Industry.

OTTO B. BLACKWELL'06, Assistant Vice-president (retired) of the American Telephone and Telegraph Company, received the Edison Medal for his contributions to the development of telephone, at the winter general meeting of the American Institute of Electrical Engineers, held January 24.

VANNEVAR BUSH'16, President of the

Carnegie Institution of Washington, was awarded the John Fritz Medal by the American Institute of Electrical Engineers at its January 23 winter general meeting in New York.

BARNETT F. DODGE'17 is the recipient of the William H. Walker Award for the excellence of his paper on high-pressure reactions and other subjects published within the past two years.

ARTHUR R. GATEWOOD'21 won the 1950 President's Award at the annual convention of the Society of Naval Architects and Marine Engineers, in recognition of the best paper presented before that society during 1949.

OSCAR H. HOROVITZ'22 won acclaim from the Amateur Cinema League for a motion picture film, "Ringling Brothers and Barnum & Bailey Circus," which was one of the 10 best amateur films to be produced during 1950.

BERNARD E. PROCTOR'23, Director of the Samuel Cate Prescott Laboratories for Food Technology, has been appointed Acting Head of the Department of Food Technology, following the resignation of William L. Campbell'15 to accept a position in industry.

BEVERLY DUDLEY'35 has been appointed to represent the Optical Society of America on the American Standards Association Committee on Photographic Sensitometry.

FREDERICK J. KOLB, JR.'38, is the recipient of the Journal Award from the Society of Motion Picture and Television Engineers for his technical paper, "Air Cooling of Motion Picture Film for Higher Screen Illumination," judged the best paper published in the Society's journal during 1949.

RALPH J. KOCHENBURGER'40 was awarded the Alfred Noble Prize on January 22 at the winter general meeting of the American Institute of Electrical Engineers in New York. The prize is awarded to the author, less than 31 years of age, presenting the best paper of the year, on the basis of selection by representatives of the Western Society of Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, American Institute of Mining and Metallurgical Engineers and the American Institute of Electrical Engineers. The paper which won this award for Dr. Kochenburger was entitled "A Frequency Response Method for Analyzing and Synthesizing Contactor Servomechanisms."

ROBERT WILLIAM MAYER'41 was awarded an honorable mention certificate from Eta Kappa Nu for outstanding work in electrical engineering.

WILLIAM R. SAYLOR'41 is chairman of the New England Radio Engineering Meeting, to be held in Boston on April 21.

DONALD P. CAMPBELL'43 received the Eta Kappa Nu plaque in commemoration of his selection as "the most outstanding young electrical engineer of 1950" on January 22, at the winter general meeting

of the American Institute of Electrical Engineers in New York.

KARL T. COMPTON, Chairman of the M.I.T. Corporation, received the \$1,000 William Procter Prize for scientific achievement from the Research Society of America, which organization is associated with Sigma Xi, honorary research fraternity. The presentation was made December 29 during the meeting of the American Association for the Advancement of Science, in Cleveland. Dr. Compton also was the recipient of the Hoover Medal on January 22 at the winter general meeting of the American Institute of Electrical Engineers in New York.

Obituary

ARTHUR R. HANKS'84, October 14.
BIRNEY C. BATCHELLER'86, November 27.°

FREDERICK H. SAFFORD'88, October 29.
DAVID P. GOODRICH'89, date unknown.
R. G. WALKER BUTTERS'90, September 30.°

FRANKLIN W. WHITE'90, December 19.
MARY P. WINSOR'90, September 1.

FRED A. WILSON'91, December 4.
WILLIAM F. LAMB'93, December 18.°
WILLIAM E. ROBERTS'93, in August, 1950.
ELWYN W. STEBBINS'93, May 20.

CHARLES L. CONANT'94, November 21.°
LEE PORTER'94, in November, 1947.°
ERNEST S. MACGOWAN'95, October 20.
EDWIN C. MCCLINTOCK'96, November 16.°

EDWIN F. WENTWORTH'98, December 3.
JAMES K. CLARK'99, June 22.
ALAN H. WOODWARD'00, November 23.°
H. B. LITCHMAN'02, November 28.

MAXWELL VIETOR'02, in October, 1950.
MRS. ALBERT H. MARTIN'03, December 19, 1939.

REGINALD HAZELTINE'04, October 20.°
JOHN W. ROLAND'04, November 6.

HENRY A. GINSBURG'06, December 13.°
JULIAN H. H. HARWOOD'08, December 21, 1949.

RUDOLPH W. RIEFKOHL'09, December 11.°

KENNETH B. HOWELL'12, September 13.
JAMES A. CREIGHTON'14, November 16.°

ALBERT F. CORNELIUS'15, June 6.
JOSEPH R. DUGGAN'16, December 20.

WALTER H. FOWLE'16, November 1.°
HARVEY H. BROWN, JR.'18 August 11.°

EDWARD H. ZEITFUCHS'18, November 3.°
LOUIS F. GEBHARDT'23, November 4.°

WILLIAM C. HAHN'23, September 11, 1949.

CHARLES G. JENKINS'27, in September, 1950.°

RICHARD L. BERRY'30, November 18.
MRS. MARSHALL W. JENNISON'30, June 2.

ARTHUR Y. SNELL'33, October 14.
PAUL BATES'39, November 13.

HENDRIK CORNELISSEN SALZEDO'39, June 4.

JAMES D. GRAZIADEI'48, November 20.°

°Mentioned in class notes.

News from the Clubs and Classes

CLUB NOTES

M.I.T. Club of Central Massachusetts

Twenty-five members and two guests braved a heavy rainstorm on December 4 to gather at the Hotel Sheraton in Worcester for our first meeting of the 1950-1951 season. Don Severance'38, Secretary-Treasurer of the Alumni Association, spoke briefly of M.I.T. affairs. Our speaker for the evening was William C. Greene, professor of English at the Institute. Professor Greene's talk touched on many subjects, including "Character Profiles," the announced title, politics, the condition of the world and the Institute's humanities program. He devoted most of his talk, however, to the humanities program, telling what progress had been made and what is planned for the near future. The variety of subject matter, and Professor Greene's inimitable style of presenting it, made the evening a very enjoyable one for all present.

Max Levine'25, President, appointed the following committees: Robert G. Clarke'35 and Haskell R. Gordon'38, Publicity; Orville B. Denison'11, Nominating; Robert H. Brown'22, Robert N. C. Hessel '27, George H. Bickford'45, William G. Scola'43, Richard H. Harris'48 and Donald M. Whitehead'45, Ladies Night.

The following members were present: Carleton A. Read'91, Harry M. Latham '93, Orville B. Denison'11, Thomas P. Kelly'18, Roderic L. Bent'19, Maurice E. Goodridge'19, Ernest P. Whitehead'20, Frederick N. Dillon, Jr.'22, Benjamin J. Bean'24, Max Levine'25, Robert N. C. Hessel'27, Arthur E. Jorjorian'31, Karl H. Volkhausen'31, Howard F. Atwood'32, W. S. Crowell'32, Frederick E. Mader'32, Robert G. Clarke'35, Harold E. Prouty'37, Haskell R. Gordon'38, George R. Blake '39, Alvin H. Shairman'43, Donald M. Whitehead'45, Raymond R. Stevens, Jr., '48, Warren O. Berry'49 and John E. Bent'50.

On January 29 at the Hotel Sheraton in Worcester, the Lapointe Machine Tool Company of Hudson, Mass., was scheduled to present a program on "Broaching in Modern Industry." This program which was to be in charge of Howard F. Atwood '32, Vice-president, promised to be of much interest since few of us are familiar with what broaching is and what it can accomplish. Other meetings are scheduled for March 19 and May 14, the latter meeting being, as usual, our annual meeting and ladies night. Programs for these meetings will be announced later. — DONALD M. WHITEHEAD'45, Secretary, 464 Salisbury Street, Worcester 5, Mass.

The M.I.T. Club of Chicago

December 11 witnessed a bang-up factory inspection trip for the Chicago Alumni. We visited the LaGrange plant of the Electromotive division of General Motors where over 60 per cent of Diesel locomotive horsepower of the United States is built.

After a tour through the plant to see various phases of the operation, we were guests of Electromotive at an excellent dinner in the office cafeteria. This was followed by talks on railroading and the development of motive power given by B. A. Dollens, Vice-president and General Manager, and R. M. Dilworth, Chief Engineer. There were 202 of us at dinner, a grand turnout which included Alumni and their guests and officials of Electromotive. — PHILIP L. COLEMAN'23, Secretary, 208 South LaSalle Street, Chicago 4, Ill.

M.I.T. Club of Great Britain

The Club held a successful dinner meeting at St. Stephen's Club, Westminster, on December 5. The President, J. W. Voelcker'23, was in the chair and the gathering represented a wide range of classes, from Channing Turner'09 to J. H. MacMillan'50, and all those present were glad to take advantage of the opportunity to get better acquainted with each other.

The Club will not celebrate its first birthday until next April, but the Secretary was able to report a steady increase in the number of members, and it was also a matter of satisfaction that 40 per cent of the members were at the meeting. We hope for an even bigger gathering at the next meeting in March (the annual general meeting).

We are busy trying to discover the whereabouts of all Alumni in Great Britain in order to make them aware of the Club's existence. The Secretary will be most pleased to hear of anyone, now living in Great Britain, whom in these early days he has not yet contacted. — D. N. deG. ALLEN, Secretary, Imperial College of Science and Technology, S.W.7, London, England.

The M.I.T. Club of the Lehigh Valley

The first meeting of the Club was held in Bethlehem, Pa., on December 14. Owing to the weather and the nearness of the holidays, only 24 members turned out. Among them were: J. T. Acker'24, W. V. Bassett'39, Allison Butts'13, William M. Cline, Jr.'29, Floid Fuller'06, President M. V. Herasimchuk'39, Frank Moore'12, Secretary Edward A. Richardson'19, John M. Smyser'35, and Frederick C. Waddell '99 of Bethlehem. Allentown was represented by Henry Moggio'28. From Hellertown came Charles H. Herty, Jr., '21, and Treasurer Arthur Gould'38. Palmerton did very well, sending Howard M. Cyr'18,

Edmund J. Flynn'19, Howard McMurry '38, B. V. Reeves'12, L. A. Wilson'14 and perhaps one or two others. Phillipsburg, N.J., sent Vice-president George Farnell '41, Isidore Loss'22, and John E. Stryker, Jr., '44.

As this meeting was devoted to Bethlehem Steel Company, two hours of the afternoon were spent on a well organized tour of the company's Bethlehem plant. At 6:30 P.M., the members met for punch bowl festivities in the '96 room of the Hotel Bethlehem. Dinner was served promptly at 7:00 P.M., so that the members might adjourn to the East Office of Bethlehem Steel. The lobby of the steel company contains certain permanent exhibits. These were demonstrated by members of the publications department. A brief inspection of the new library was made and the moving picture, "Fifteen Minutes of Steel," was then shown, a very effective presentation of the character of steel and its production. Robert Smith, manager of community relations for Bethlehem, discussed the problems facing the large corporation in its dealings with the communities throughout the country which contain Bethlehem units. He described the company policy as that of the "Good Neighbor."

To the Technology men present, the principal talk of the evening may have been that of our own Dr. Herty, the assistant to the vice-president in charge of operations, S. J. Cort. Dr. Herty is well known for his work in standardizing oxidation and slagging procedures in steelmaking. He is concerned at present with the direction of the rather complex research organization of Bethlehem Steel. Each plant has some organization of its own for the purpose, and corporation technicians co-operate with plant organizations. Bethlehem maintains no large organization for research, partly because the research organization is relatively new, partly because it has seemed more expedient to keep the number of highly specialized men to a low figure, sending out such work as requires highly specialized men or equipment to research organizations.

After a period of directing questions to Mr. Smith and Dr. Herty, the meeting was adjourned. Those able to attend felt that it had been very successful and that Bethlehem Steel Company had organized its part in the meeting very well.

As you may know, this somewhat unwieldy section of the Alumni holds approximately three meetings a year. It has been proposed that the next meeting be held in February, but some of us think better success would be secured by waiting until mid-March for weather permitting traveling from the coal regions. In any case, there will be an annual meeting in May or June, at which the ladies will be present. — EDWARD ADAMS RICHARDSON'19, Secretary, 3015 North Center Street, Bethlehem, Pa.

New Haven County M.I.T. Club

Our 1949-1950 annual outing was held on June 3 at the Pine Orchard Club, Branford, Conn. Registration started early in the afternoon and continued until the dinner. Members and their families enjoyed a fine afternoon of golf, tennis, boating, bridge, and so on. Outdoor endeavors were climaxed by a delicious meal. Our meeting was called to order by President Frank Nettleton'30, with several fine "spontaneous" talks, a standard treasurer's report by Carlton Miller'46 and a thoroughly enjoyable annual report of activities by Secretary Al Libbey'26. Prizes were awarded to our triumphant heroes in acknowledgment of their achievements on the turf, court and table during the afternoon.

The following slate of officers was presented by Committee Chairman Walter S. Wojtczak'37; Cliff Lytle'37, President; Beverly Hubbard'25, Vice-president; David Black, Jr., '46, Treasurer; and Richard C. Maconi'44, Secretary. This slate was unanimously approved and elected. Following the usual acceptance speeches, the meeting was adjourned and followed by informal dancing and entertainment.

Our first meeting of the 1950-1951 year was held on December 19 at the Waverly Inn, Cheshire, Conn. Several of the usual faces were missing at this meeting but new ones joined us. The evening began with Dutch treat cocktails from arrival until President Cliff Lytle gave the go-ahead nod to the head waiter. The dinner was delicious and proceeded according to long established routine. The informal meeting adjourned to complete the evening with dancing to the music of the inn orchestra.

Our next meeting was scheduled for February 2 to be held at the Restaurant Institute of Connecticut in New Haven. This was planned as a dinner meeting to begin at 7:00 P.M. — RICHARD C. MACONI, *Secretary*, Hickory Hill Road, North Haven, Conn.

The M.I.T. Club of New York

Nearly 300 Technology men in New York gathered at the club headquarters for the annual steak-stein dinner on November 2. Fearing for their lives, the committee in charge, headed by Don Taylor'35, searched and sampled and guaranteed no misrepresentations. Everyone actually did get a steak and a Stein!

A portable bar was set up for a magician bartender who entertained us after dinner. Two large glass cocktail shakers filled with a colorless liquid, proclaimed water, were offered for inspection. Then the bartender asked for orders — the more complicated to mix, the better. With each order, the bartender selected the proper empty glass, gravely poured in "water" and produced a real drink.

John Plantinga'45 reminded those present of the social evening scheduled for December 8. A committee of Joe Littlefield'17, Dale Spoor'22, Dudley Parsons'26, Morgan Cooper'47, Larry Cumming'26, H. P. Willard'47, J. M. Randolph'48, Harold Ottobrini'48, Steve Miller'48 and John gave us a perfect dinner dance at the

Park Sheraton Hotel. The dance floor was comfortably crowded, the orchestra excellent, and the low-ceilinged, friendly atmosphere of the Palm Room, just right. — G. PETER GRANT, JR., '35, *Secretary*, Grant Photo Products, Inc., 401 Broadway, New York, N.Y.

Niagara Falls M.I.T. Club

The new season of the Club began with a dinner meeting on November 9, 1950, at the LaSalle Yacht Club. After dinner President E. C. Forbes'41 related a few humorous incidents of the Club's past history. In a brief business session, representatives were appointed for each local plant which had more than one alumnus in its organization. It is hoped that this will increase the operating efficiency of the Club. At the conclusion of the business meeting, Arthur Evert, President of the Niagara Falls Movie Camera Club, showed several colored films from a recent trip to the West Coast.

Attending the meeting were: Gurdon M. Butler, Jr., '38, L. F. Cavendish, Jr., '38, Edward Depoyan'30, Norman Duffett'11, W. T. Dunlap, Jr., '22, E. C. Forbes'41, Joseph J. Forrester, Jr., '22, A. T. Hinckley'08, William H. Hope, Jr., '36, Anton W. Hosig'23, R. B. MacMullin'19, Harry S. Myers, Jr., '44, T. Francis Twomey'33, Lester M. White'12, and James Woodburn, Jr., '44. — JOHN J. SEAMAN'35, *Secretary*, 8234 Witkop Avenue, Niagara Falls, N.Y.

M.I.T. Club of Philadelphia

Professor Erwin Haskell Schell'12 gave another of his fine talks — this one featuring "New Responsibilities and Opportunities" — and all who were in attendance at our annual Campbell Soup meeting went away with both their physical and mental appetites well supplied. Many of us had the added pleasure of once again talking with our old friend Lobby, who seems to be pretty much on the run these days, visiting not only Alumni in this country but in foreign ones as well.

Many of you know that one of our assistant secretaries, Proctor Wetherill'34 recently took a leave of absence from his company on account of an undisclosed illness. Imagine, then, our surprise to learn that while he was on such sick leave, the National Guard (28th Division) recalled him to duty and rushed him and his wife away. He narrowly missed being in the tragic accident that killed so many of his outfit, since he had flown the previous day. We've written to him, but guess his duties haven't permitted a reply. His address: Major Proctor Wetherill, Headquarters, 28th Division, Artillery, Camp Atterbury, Edinburg, Ind.

Our supersecretaries, Sam and Nancy McCauley ('41), are having both a wonderful and rugged time in Boston on the Sloan Fellowship. Not only does Sam have his assignments lined up days in advance, but the plan calls for full participation by the wives and families. Naturally, there are committees, and we've verified that our Club is well represented in the secretarial staff of some of these! Wes Van-Sciver'40 has now moved to California

(we'd like to hear from this modern entrepreneur) and he feels that it is the "Land of Promise" for engineers, production men and salesmen at the present time. Good luck to you, Wes, and don't forget us.

Your Nominating Committee has now met and feels it has a marvelous slate to offer at the next meeting. In these crucial days when no one seems to know what the future holds for us, the association of one's schoolmates takes on new meaning; may we see all that can possibly attend at the next meeting. — SAMUEL K. McCUALEY'41, *Secretary*, Apartment 1122B, 100 Memorial Drive, Cambridge 42, Mass. *Assistant Secretaries*: WILEY F. CORL, JR., '39, Box 358, Bryn Mawr, Pa.; PROCTOR WETHERILL'34, Headquarters, 28th Division, Artillery, Camp Atterbury, Edinburg, Ind.

M.I.T. Club of Schenectady

The evening of November 20 found 35 Alumni, their wives and guests assembled at dinner at the Edison Club, Rexford, N.Y., to hear a very informative and interesting presentation of the humanities program at the Institute by Harold L. Hazen '24, Head of the Department of Electrical Engineering. Professor Hazen was introduced by Don P. Severance'38, Secretary-Treasurer of the Alumni Association, who, along with H. E. Lobdell'17, Executive Vice-president of the Alumni Association, was a guest of the Club that evening.

Professor Hazen outlined the activities of the Faculty Committee on General Education, of which he was a member, to determine the needs and means of emphasizing the humanities subjects in an engineering curriculum. An extremely lively and enjoyable question and discussion period followed. Comments from a number of Alumni indicated that this was in every way one of our best meetings. In this regard, credit must be given to Fred Barrett'34 who arranged all details and also served as a very able toastmaster.

The following Alumni were in attendance: J. E. Acker'38, J. R. Alger'49, P. L. Alger'15, C. F. Barrett, Jr., '34, H. W. Bibber'20, L. B. Bragg'25, Francis Brown, Jr., '48, B. O. Buckland'20, E. H. Cabaniss'38, Harold Chestnut'39, L. J. Goldberg'26, H. E. Harris'44, G. C. Houston'27, G. M. Ketchum'41, C. J. Koch'23, E. S. Lawrence'47, Shepard Roberts'38, A. W. Robinson, Jr., '41, W. B. Rodemann'44, D. P. Strang'45 and J. B. Taylor'97. Also in attendance were the Mesdames: Acker, Alger, Bibber, Buckland, Cabaniss, Chestnut, Rodemann and Taylor.

Recent committee activities of the Club include a meeting on December 7 of the Civic Projects Committee consisting of W. B. Rodemann'44, co-chairman; E. S. Lawrence'47, cochairman; J. E. Acker'38; and L. F. Coffin'49. Plans were made to contact various members of the Schenectady City Council in connection with the proposed school expansion program. The committee is working in conjunction with the Education Committee of the Schenectady Chamber of Commerce to foster interest in the expansion program by the members of the council. — EDWIN S. LAWRENCE'47, *Secretary*, Building 99, Gen-

eral Electric Company, Schenectady 5, N.Y.

Washington Society of the M.I.T.

December 14 was the date of the third meeting of the Club. For that occasion, the guest speaker was Geoffrey W. Lewis, deputy director of the Bureau of German Affairs of the Department of State. Mr. Lewis has made many speeches throughout the country on the problems confronting our policy makers in Germany. It is his contention that Germany is the key to the world situation. He described the efforts of this country to revitalize the German economic structure; to establish a sound economy under the restraint of an occupation by several countries. Mr. Lewis clarified the problems facing this country in its attempt to obtain the co-operation of France, England and other North American Pact nations for the establishment of a unified front to resist Soviet imperialistic aggression and expansion.

The second topic of the evening was the reaction of the German people to the "police" action in Korea. Although impressed by the quick action of the United Nations in aiding the South Koreans, they were, nonetheless, alarmed at a situation that could very easily have had its location in Germany. As U.N. successes came one on top of another, the spirit of the German people rose. Since difficulties have appeared, they have kept their high spirit and appear to be determined to resist Soviet imperialism. At the conclusion of his speech, Mr. Lewis opened the meeting for a question-and-answer period.

The fourth meeting of the current year was held on January 11 at the Willard Hotel. All Alumni in the area were cordially invited. — GEORGE W. STONE'89, Secretary, 410 Cummings Lane, Chevy Chase, Md. FRANK S. POHANKA, Jr., '44 Review Secretary, Route 1, Midland Road, Paint Branch Farms, Silver Spring, Md.

The M.I.T. Club of Western Pennsylvania

The first meeting of the current season was held at the University Club on September 19, 1950. After a pleasant half hour with the stein and enjoyable conversation, dinner was served at 7:00 P.M. The business meeting was opened at 8:00 P.M. by our former president, Duke Lafan'19.

Karl T. Compton was the guest of honor at our meeting on October 26. This was a joint husband-and-wife affair. The officers for the year are: Henry Rockwood'32, President; Bill Davidson'26, Vice-president; Tom Barker'27, Treasurer; Louis Johnson'43, Secretary; Art Mason'33, Registrar; Charlie Peck'41, Entertainment Chairman; Aaron Redcay'34, Membership Chairman; and George Hoffman'28, Publicity Chairman.

Charlie Peck then introduced the speaker, Charles W. Paape of the Carnegie Institute of Technology. His subject was the "Battle of Know-How" or the "Battle Behind the Front." Dr. Paape compared American knowledge with Russian and stated that we cannot think of the present conflict in the same way as we thought of the last war. Within the last 30 years com-

munism has covered 30 per cent of the world. One reason for this is that democracy is not known throughout the world as it should be known. We should apply our efforts to understanding other peoples and letting them understand us. A lively discussion of this important and timely topic was held by the Club members.

The following were present: Harold M. Baker'30, Charles T. Barker'27, C. T. Blackmore'15, E. L. Chappell'24, D. W. Dimock'28, V. J. Dober'36, George M. Hoffman'28, B. M. Hutchins'32, Herbert Kay'47, William C. King'48, Fred Kurzweil, Jr., '50, R. G. Lafan'19, Harold L. Lang'09, Walter F. Limbach'45, John W. Logan, Jr., '20, R. A. Lytle'30, I. E. Madsen'33, A. T. Mason'33, George A. Morrison'09, George C. Morrisette'35, Charles F. Peck, Jr., '41, Aaron Redcay'34, Henry Rockwood'32, R. G. Schmidt'48, and J. A. Tryon'24. — GEORGE C. MORRISSETTE, Acting Secretary.

The third meeting of the 1950-1951 season was held at the University Club on November 15. After our usual enjoyable stein and dinner, the meeting was called to order by our President, Henry Rockwood. The program consisted of an interesting and enjoyable movie entitled, "Timber Head," loaned to us by the Union Barge Line Company, a subsidiary of the Dravo Corporation.

The following members were present: Aaron Redcay'34, R. G. Lafan'19, G. A. Morrison'09, C. M. Boardman'25, C. F. Peck, Jr., '41, Henry Rockwood'32, A. J. Abrams'24, C. T. Barker'27, Julian Gammon'45, H. E. Heilenthal'34, R. C. Wellwood'33, W. M. Davidson'26, and J. R. Winterbottom'30. — LEWIS K. JOHNSON'43, Secretary, in care of Ingersoll-Rand Company, 932 Pennsylvania Avenue, Pittsburgh 22, Pa.

CLASS NOTES

• 1886 •

On November 28 your Secretary received from Lawrence C. Jones, attorney, the following notice: "I regret to inform you that my good friend Birney C. Batcheller passed away late yesterday afternoon." The Secretary asked that he be sent any death notices that appeared in the local papers concerning the event. On December 6, Mr. Jones wrote again enclosing clippings from the Rutland *Herald* of November 28 and December 6 from which I quote as follows: "Birney Clark Batcheller, 85, of Wallingford, Vt., well known retired engineer, died . . . November 27, in Rutland Hospital. Mr. Batcheller was the first person to design a pneumatic tube of sufficiently large proportions to carry mail and in 1893 installed one between the main post-office in Philadelphia and sub-station half a mile away. He was employed by the Pneumatic Dynamite Gun Company and afterwards by the Pneumatic Torpedo and Construction Company. He was chief engineer of the companies that constructed and operated underground pneumatic mail tubes in Philadelphia, New York,

Boston, and Chicago. As chief engineer for the Pneumatic Transit Co. in Philadelphia, he wrote an article on locating obstructions in underground pneumatic tubes in Philadelphia. The Franklin Institute of Philadelphia awarded him the John Clarke gold medal for his pneumatic inventions.

"Retiring from active engineering in 1921, he served in the Gas Defense Service at the Long Island Laboratory during World War I. Mr. Batcheller was born in Wallingford on April 6, 1865, the son of Justin and Henriette (Clark) Batcheller. He attended the Wallingford public schools, Phillips Andover Academy, and received his Bachelor of Science degree from . . . Technology in 1886, and his Doctor of Science degree from Middlebury College in 1938. Mr. Batcheller married Annie C. Chapin of Beloit, Wis., on October 7, 1900. After her death he married Louise C. Perkins of Rutland on Feb. 21, 1925. He was a member of the Legislature in 1929 and 1931, and the Senate 1933 and 1935. He was chairman of the tax committee, and chairman of the finance committee authorized by the 1935 Legislature. Mr. Batcheller had been a director of Rutland Hospital, Vermont Tuberculosis Association, and Caverly Preventorium. He achieved engineering fame and fortune as the designer of a large-scale pneumatic tube and eventually acquired fifty patents on pneumatic tube designs. For his work in this field, he was awarded a medal by the government of France and the John J. Scott medal from the Franklin Institute of Philadelphia."

Mr. Jones informed me that Mr. Batcheller had left provision in his will, recently filed in the Rutland district of the Probate Court, whereby the M.I.T. would receive 20 per cent of the residue of his estate, which bequest Mr. Jones stated would be upward of \$100,000. The Secretary hopes that this bequest will come as a contribution to the new Alumni Fund, and the Class of '86 will receive due credit from our classmate's munificence. The Secretary has nothing more to report other than the negative item that the '86 men do not support him adequately either with cash or information: \$35 are necessary to carry through to June, 1951. — ARTHUR T. CHASE, Secretary, Post Office Box 4, Island Creek, Mass.

• 1890 •

The Secretary finds he owes an apology to the Class of '87 and to their Secretary, Lonsdale Green, who writes that they had a real 60th anniversary and encloses a page from the November, 1947, Review to prove it. With the growing classes and increased longevity, it doubtless will become an annual occurrence.

Another classmate present at our 60th has passed on. R. G. Walker Butters died in Haverhill, Mass., on September 30, age 83. Shortly after leaving Technology, he became connected with the New England Telephone and Telegraph Company and continued with them in varying capacities until he retired a few years ago. He told us last June about living in a house with 17 rooms, and the Haverhill *Gazette*, refers to him as "the last member of one of the city's oldest families, and the oldest

living member of The First Congregational Church, a speaker at its 50th and 75th anniversaries, presenting a history of the parish. He was a member of the Whittier Club, the Haverhill Historical Society, and the Telephone Pioneers of America."

Lenfest, who was below par at our reunion, following two serious operations, reports he is back in good condition and "made a 15-day run to Iowa and Kansas without a hitch, getting around to all three meals daily." — Several times the Secretary has referred to our lack of information and contacts with those who studied architecture, and he is much pleased to have the following from Charles Alden: "I always realized that the make-up of our M.I.T. architectural department in my time was confusing. We had the 'regulars' as they were called, those who took the prescribed courses of study with the intention of graduating; some who took a 'partial' course leading to a certificate; and others, mainly those who had some experience with architectural practice and wanted to add something M.I.T. had to offer. There were only five 'regulars' in the Class of '90 who followed through to graduation: Emery, Miss Hayden, Nims, Walker and myself. Emery had graduated from the University of Minnesota and came to M.I.T. with me to take architecture after I had left the University at the end of my sophomore year. We were both enrolled provisionally in the M.I.T. Class of '90. Walker, as I have remembered it, had taken the first year at M.I.T.

"After graduation at M.I.T., Emery took a position with the architectural office working on the Chicago World's Fair of 1893. He was a thorough musician — sang in the M.I.T. Glee Club, then a quartet, taught music to some extent while a draftsman; and when his work in Chicago as draftsman was completed, devoted himself to teaching music for which he seemed to be eminently fitted; was professor of music at a well-known mid-west college. Walker did well as a student at M.I.T. and immediately after graduation took a position as a draftsman in an architect's office in Boston and remained there, I think, until he died approximately 40 years later. Have no doubt, he did good work in architecture but never heard of his practicing under his own name. He was active and efficient in church work while a draftsman.

"An important part of our work at M.I.T. was design courses in which we regulars had severe competition as we had to spend time on other required subjects in order to graduate. Among those taking few, if any, courses besides design were Fenn, Pennell and Ripley. Another, Lyman A. Ford, took work with our Class but was credited in the Technology Roster as '89. He was pleasant and popular on account of the generous help he gave to others in the Class. He even gave valuable help to a green instructor of one of the practical courses he was taking with us when said instructor got in over his depth. Among many other specials was Machado who cut quite a figure without working hard himself but had a pleasant personality. Other special students of some note credited to '90 whom I remember were E. V. Seeler, B. B. Smith and

G. W. Taylor, all now deceased."

The Class will be interested in a newspaper report that although the Charles Hayden Foundation has already made gifts of \$15,000,000, its present assets amount to \$51,000,000. The address of Mary L. W. Morse is now Poland, Ohio. Franklin Knight is at Stockbridge Road, Lenox, Mass., and W. P. Flint is back at 3726 First Avenue, North, St. Petersburg. — **GEORGE A. PACKARD, Secretary, 53 State Street, Boston 9, Mass.** **CHARLES W. SHERMAN, Assistant Secretary, 16 Myrtle Street, Belmont 78, Mass.**

• 1893 •

The Secretaries regretfully report the death of William F. Lamb on December 18. The following is from the Boston *Globe*: "William F. Lamb, 78, president and treasurer of Cunningham, Lamb and Prince, Inc., Charlestown lumber dealers, died . . . outside Boston Municipal Court. . . . A native of Roxbury, he attended Boston Latin School and was graduated from M.I.T. . . . He entered the lumber business upon graduation. He was a resident of Newton for 40 years. He is survived by his daughter, Mrs. Eleanor O'Neil; a son, Eric F. of South America; his wife, Edith (Tupper); and a sister, Mrs. Chester Morrison of Brookline. . . ." — **FREDERICK H. KEYES, Secretary, Room 5-213, M.I.T., Cambridge 39, Mass.** **GEORGE B. GLIDDEN, Assistant Secretary, 38 Chauncy Street, Boston 11, Mass.**

• 1894 •

As these notes are written near the end of the year, the Secretary deems it appropriate to extend to all the Class, and others who may read the news of '94, the very best wishes for the year ahead and those that may follow. He was greatly pleased to receive the greetings of the season from so many of the Class, and thanks are expressed to Abbot for his unique little booklet containing stories picked up in his travels to remote parts of the world; to Nowell and Sperry for their personal notes expressing hope that the Secretary will again visit California; to Patrick and Horton for greetings from Cape Cod; to Hunt, Bean, Owen, Taber, and Schiertz from their respective New England homes; and to President Crary and Billy King from farther afield.

A telephone conversation with Alan Clafin brought an exchange of New Year greetings and also the splendid news that after his hospital experience of a few months ago Alan is again as good as ever, and apparently as full of pep and business. Through Clafin, it was learned that Harold Chase had come through an operation for cataracts most successfully and says he can see better than ever before. In addition to congratulations on this triumph, the Secretary is heartened tremendously as he may eventually have to undergo a similar experience. The Class will be happy to learn that Mrs. Albert Tenney has provided perpetual illumination of the Minute Man statue on Lexington green as a memorial to Albert, who was very active in all civic affairs in the town. It is a pleasure to state that the Secretary had a very small part in securing the ad-

vice and service of Professor Herbert Beckwith '26 of the School of Architecture who generously helped Mrs. Tenney by giving the proper attention to the lighting to make this unique memorial one greatly appreciated by the citizens of the town and by all friends of Al.

In going over the records for the year, insofar as they are available, it is gratifying to learn that every one of the Class who attended our 55th reunion two years ago is living and in good health. Maybe it pays to attend reunions! Our losses in the Class during the year apparently are six in number, although the deaths of four others who had died before 1950 have also become known.

Lee Porter, who was with the Class only during the freshman year, died in November, 1947. He had formerly lived in Auburndale. Charles L. Conant was also a member of the Class during the early years, taking the short course in drawing and shopwork that was popular in the early nineties. His death occurred on November 21, 1940. A clipping from the Lewiston *Journal* states that while walking along Main Street, Lewiston, he suddenly became ill, entered the social security office nearby and died almost instantly. Conant was a native of North Auburn, Maine, the son of Benjamin and Lucy Conant. After graduation from the Edward Little High School in Auburn, he came to the Institute, but on the death of his father returned to Maine to become associated with the family business, the Bradford-Conant Company, which ceased activity in 1939. Conant was active in Auburn affairs, attended the High Street Congregational Church, and had been a member of the Lewiston-Auburn Rotary Club. He was 80 years old last February. His wife, to whom he had been married for 50 years, and a son, Roger C. Conant of Auburn, and a daughter, Mary Alice Conant of San Antonio, Texas, survive him.

Several changes of address have come to the Secretary's attention. Jim Kimberly has made his annual return to his winter home, Tryon, N.C., (Box 1175). Milton M. Wheeler has gone back to Sarasota, Fla., (Box 206). H. M. Chase has a new address in Danville, Va., his home now being at 158 West Main Street. John W. Kittredge has removed from Hartford and is now located at 239 Porter Street, N.E., Warren, Ohio. The Secretary has a new abode at 100 Memorial Drive, Cambridge 42, but is almost daily at the Institute, and has practically completed the preparation of the manuscript of the history of the Institute up to the time of removal to Cambridge. New material and a desire for more detail in some portions have caused him to revise the whole material, and it should be ready for the publishers in a few weeks. It has been an interesting two-year job undertaken solely from a sense of loyalty and the belief that the history of this period should be made into a continuous record. Readers may have noticed that the long-hoped-for new building for the Departments of Biology and Food Technology is now in process of construction. This is to be called the John Thompson Dorrance Building, named for J.T.D.'95, and will contain the

Prescott Laboratory of Food Technology, named for your Secretary. — SAMUEL C. PRESCOTT, *Secretary*, Room 5-213, M.I.T., Cambridge 39, Mass.

• 1895 •

Professor Charles M. Gay has changed his address from Philadelphia to 162 East 80th Street, New York City, N.Y. The Massachusetts Wachusett Council, Boy Scouts of America, at their annual dinner on December 6, 1950, bestowed the "Silver Beaver Award" on your Secretary for services rendered to boyhood.

The following citation accompanied the award: "Giving from a life richly filled with experiences as an engineer and a Civic minded participating citizen; leader, counselor, and guide of boys in the Scouting traditions, he has been confidant, disciplinarian, and father to each Scout in his Troop in his five years of Scoutmastership.

"Assuming Scoutmastership at a time in life when most men are prone to relinquish the cares and responsibilities of volunteer service to their fellow man, he has consistently given his Scouts a well rounded program of indoor and outdoor activities. Through wise use of the Scouts he has builded future leadership, capable and willing of accepting the responsibilities necessary for the continuation of the American Way of Life. The Wachusett Council is happy to present the Silver Beaver Award for distinguished service to boyhood to Luther K. Yoder." — LUTHER K. YODER, *Secretary*, 69 Pleasant Street, Ayer, Mass.

• 1896 •

Greetings! On November 29, fourteen of our members — M. Pierce, F. Rundlet, H. Baldwin, P. B. Howard, J. Driscoll, H. Hedge, G. Hewins, H. Lythgoe, H. Crush, C. Gibson, W. Dorrance, R. Davis, Fred Damon and J. A. Rockwell — attended a luncheon at the Engineers Club in Boston. We also heard from B. Ames and R. Henry who expected to be present but were unavoidably detained. It was a great pleasure to meet such a representative group of the boys. Where to hold our 55th reunion was, naturally, the point of major interest. We report that there were divided opinions as to where, when and how to call the clan together.

We seem to be heading into a new approach to our reunion as we realize the age limitation in its relation to traveling conditions, especially as to distance from Boston. As of this writing it appears that Swampscott (New Ocean House) has a greater facility for meeting our various needs than other hostelleries that we have investigated. Before you receive these class notes, you will have been circularized by a questionnaire that will speak for itself and should be promptly attended to.

After two weeks of enforced detention at the Mount Auburn Hospital, the Secretary was able to make observations of the hospital's routines from the point of view of a patient with a physician's background. Being pleasantly impressed by the general operative routine of this institution, I made a report of my observations to the hospital director. The reason for my hospitalization is that I have not

entirely eradicated the x-ray damage to various parts of my body initiated some 30 or 40 years ago when I exposed myself to Gamma (x) Ray. This required two weeks of hospitalization (December 7 through December 20) with surgical repair.

This pleasant comment was sent from Amos Robinson on November 18: "Sitting in my shirt sleeves today. The corona vine is in gorgeous bloom." His address — Post Office Box 35, San Juan, Texas. Ada E. Daniels is now at 755 Asylum Avenue, Hartford, Conn. The Secretary telephoned Rev. Partridge at the Storrow House where he is in about the same state of health. We regret to report that Edwin C. McClintock died on November 16. — JOHN A. ROCKWELL, *Secretary*, 24 Garden Street, Cambridge, Mass. FREDERICK W. DAMON, *Assistant Secretary*, 275 Broadway, Arlington 74, Mass.

• 1898 •

Here continueth the story of Dave Fenner (see December class notes for the first chapters): "In his long career in the highway transport field Mr. Fenner has taken active part in several organizations in the industry. He has been a leader of the Motor Vehicle Conference committee of the Automobile Manufacturers Association, and of the National Highway Users Conference since its inception in 1932. He is president of the Automobile Old Timers, which has a membership of 3,300. When the National Highway Users Conference, at its biennial convention in Washington last month, honored those who had devoted the first half of the 20th century to highway transportation, Mr. Fenner was selected as representative of the men who had developed the industry.

"Award of the engraved citation at the third Highway Transportation Congress at the Mayflower hotel came as a surprise to Mr. Fenner. It was presented by Alfred Reeves, a close friend and business associate of Mr. Fenner for more than 40 years, and former managing director of the Automobile Manufacturers Association. Presenting the citation, Mr. Reeves said, 'When we evaluate the progress of highway transportation since the beginning of this century, we can hardly do so without recognizing that it represents the enterprise, knowhow and efforts of men, some of whom are still actively engaged in the development of highway and automotive transportation. Selected as typical of these men is David Fenner of Mack Trucks. To these honors that prove his competency,' continued Mr. Reeves, 'must be added the uniform courtesy that has won him countless friends who hold the most profound respect for a name and a man that are synonymous with this great field of highway transportation.'

Facing the reader of the article is a fine illustration of our classmate receiving the award, under which is the legend: "50 YEARS SERVICE — David C. Fenner of Elm Road, Falmouth, receiving from Alfred Reeves . . . advisory vice president of the Automobile Manufacturers Association, the association's plaque honoring him for his half century in the highway transportation field. Looking on . . . is Albert Bradley, vice president of General Motors

and chairman of the National Highway Users Conference." Congratulations, Dave! In your honoring, all '98 is honored. (To be concluded in a subsequent issue of The Review.)

Many of our classmates have served with distinction in almost every quarter of the globe. Listen to this letter written to our newly elected president, Dan Edgerly, by W. W. Stevens, IV, the head architect for many years of the Standard Oil Company in China and Japan: "First, congratulations to the Class on their new president. I remember with pleasure the times I sat in on chats between you and other Technology Alumni in the dining room and on the veranda of the old club house on Gramercy Park, around 1912. You were enthusiastic about titanium.

"Bodwell telephoned me that you had requested him to tell me you want a letter from me for the class notes because I spent some time in the Orient and might have something of interest on China, Japan and Korea. I told him I left Japan 15 years ago (1935), China 30 years ago (1920), and never was in Korea. You can figure how much I would have of present interest.

"As for personal information, I was retired by Standard-Vacuum in 1935, from Japan, came home the long way, via Shanghai, Hong Kong, Manila, Colombo, Suez, Genoa, Barcelona to Dover. Spent the summer in England and returned to New York, drove across the country and have been in San Diego since 1936. My wife died in 1940 and since then I have lived alone. My health continues good. If you come this way, I hope you will come to see me or at least call up so I can go to see you. Best wishes to all '98 and to you as president."

Another distinguished '98 architect, who has spent many years abroad in his chosen profession, is Corham P. Stevens. Dan sends the following: "A very interesting letter from Corham P. Stevens will be enclosed in the next class letter. Stevens is the only classmate who is now residing in a foreign country outside of North America. From 1911-1932, he was director, American Academy in Rome; since 1932, as director and as honorary architect of the American School of Classical Studies, Athens, Greece. His prime interests now are archaeology and relief work.

"In archaeology, the chief excavation of the school has been and still is the Ancient Agora of Athens. Several million dollars have been expended with present results that the architectural finds have been particularly important as to practically all of the ancient administration buildings.

"The relief work in which Corham is very much interested has extended over the past 12 years. The country suffered terribly from the Germans in World War II and again in the civil war of 1944. The danger is not entirely passed, with renewed fears of an invasion of Northern Greece from Bulgaria and Albania. Stevens strongly indicates this is a communist problem from both within and without Greece. Especially in Northern Greece some 100,000 people are returning to their old homes to work in the fields and rebuild their houses. They have a hard and difficult time ahead. Relief of several

kinds is being furnished especially through the general headquarters of the Near East Foundation, 54 East 64th Street, New York."

You know, it is just like meat and drink and a sandwich for your Secretary to be receiving these volunteered news items. We have George Treat to thank for the following interesting news item: "George Cottle was elected a member of the board of trustees of Hebron Academy, Maine, in June, 1950. Hebron Academy is a boys' preparatory school founded in 1803." George Treat volunteered the following information concerning this boys' school, from which he was graduated in 1894, before enrolling at M.I.T., and in which he has been greatly interested for many years. He has been a trustee since 1925, vice-president and chairman of the Finance Committee. Another Hebron graduate of 1904, now president of the board of trustees, is Roscoe H. Hupper, senior member of the firm of Burlingame, Veeder, Clark, and Hupper, New York, an outstanding firm of admiralty attorneys. Mr. Hupper is trustee of the Luckenbach Estate, which controls \$50,000,000 of ships. The headmaster is Claude H. Allen, Jr., for 15 years assistant headmaster of Deerfield Academy prior to coming to Hebron in 1946. The enrollment of the school is 165 boys. Boys are prepared for M.I.T., Harvard, Yale, and, in fact, for leading colleges of the country. Graduates are found in all quarters of the globe.

George mentioned that he has a new address, 31 Milk Street, which please note in your directory. With his usual modesty, George did not mention that for several decades he has been the bright angel and inspiring genius at Hebron, and that Hebron owes many of its buildings and facilities to his tireless efforts and abounding generosity.

In the November, 1950, issue of The Review, the retirement of Clarence Goldsmith was mentioned. Clarence now advises that his address has been changed from 60 Elm Street, Andover, Mass., to Pine Lodge, South Main Street, R.F.D. 1, Andover. He has been good enough to send to us the following release to the press concerning his retirement: "The National Board of Fire Underwriters announces the retirement of Col. Clarence Goldsmith, assistant chief engineer in charge of the National Board's Chicago office, after 43 years' service. Colonel Goldsmith entered the employ of the National Board of Fire Underwriters in 1907, several years following his graduation from . . . Technology. He was placed in charge of the Chicago office of the National Board when that office was established in 1918. In both World War I and II he served as an expert on fire protection. For nearly two years during World War II he worked with the Chemical Warfare Service assisting in the development of incendiary bombing techniques. He was also chief consultant on fire protection for the Office of Civilian Defense. In 1944, the OCD awarded him its Service Bar in recognition of 4000 hours of unpaid service contributed to civilian defense. During the last months of the war in Europe, Colonel Goldsmith aided

the U.S. Strategic Bombing Survey in studying the effects of the bombing of the Ploesti oil fields in Rumania and incendiary bombing in Germany, and helped work out bombing data used by the U.S. Army Air Force in its final attacks on Germany."

From the East Boston *Leader*: "BY THE STROLLER — East Boston sons and daughters are to be found in distant places of our country, and many will be pleased to hear that Charles H. Godbold who was educated here in the local schools and graduated from . . . Technology now resides in San Fernando, California, where he went in 1900. He has visited East Boston occasionally and has fond recollections of the home town."

From the *Transcript*, Dedham, Mass.: "Celebrating their golden wedding anniversary at a family gathering . . . were a prominent Dedham couple, Mr. and Mrs. Maurice F. Delano of 302 Mt. Vernon Street. Many friends and relatives 'dropped in' during the day to congratulate the happy pair, whose marriage was solemnized on September 26, 1900, in the Second Baptist Church of Suffield, Ct., by Rev. O. O. Fletcher. Mr. Delano is a native of Troy, N.Y., and Mrs. Delano, the former Helen C. Halladay, was born in Suffield, Ct. He is an alumnus of . . . Technology, class of 1898, while Mrs. Delano received her education at Connecticut Literary Institution. Former residents of Millville, N.J., and Vineyard Haven, the Delanos have lived in Dedham for 21 years. Their children are Margaret Louise Delano of New York City, Eleanor Delano Polishook of Havertown, Pa., and Maurice F. Delano, Jr., of Darien, Ct. They also have five grandchildren." Congratulations, Helen and Dell! May you live to enjoy the 60th anniversary.

New addresses: Howard J. Benson, 2700 Walnut Grove Avenue, Garvey, Calif.; Howard L. Bodwell, 1424 Torrey River Road, La Jolla, Calif.; Alfred H. Caspary, 50 Broad Street, New York, N.Y.; Walter A. Cleaveland, 5109 Encino Avenue, Encino, Calif.; George R. Davison, 218 West Wyoming Avenue, Melrose 76, Mass.; Lester D. Gardner, 875 West End Avenue, New York 25, N.Y.; Willard B. Nelson, 39 De Mott Avenue, Baldwin, N.Y. — EDWARD S. CHAPIN, *Secretary*, 463 Commercial Street, Boston, Mass. JOSEPH C. RILEY, *Assistant Secretary*, 9 Pond View Avenue, Jamaica Plain, Mass.

• 1900 •

Chester Richardson very thoughtfully sent to the Secretary several colored pictures that his daughter took at the reunion. These will be kept, with some that were obtained from alumni headquarters, in the secretary's files for exhibition at any future class meeting. Richardson wrote: "I am happy to say Mrs. Richardson remains quite comfortable. Agnes is getting established in Durham at the University of New Hampshire as a technical assistant in the bacteriological laboratory. She is enjoying her work and the location and can get home on occasion in approximately two hours. We are busy at the office on the Allegheny County (Pittsburgh) sewage treatment plant."

Fred Everett writes: "Mrs. Everett and I celebrated our 50th anniversary the 12th of September by having a family dinner with 18 present. I had to put in two weeks at the hospital at Hanover. The heart over-worked I guess. I have taken off 20 pounds and am using crutches to get around. The crutches work better than the two canes."

The following is from the Boston *Record* of November 24: "A. H. (Rick) Woodward, 74, prominent figure in the nation's steel industry and well-known sportsman, died yesterday in a Birmingham hospital. Woodward was board chairman of Woodward Iron Co., of Birmingham and vice board chairman of the Wheeling Steel Corp., Wheeling, W.Va. He owned the Birmingham Barrons of the Southern Association from 1909 to 1936, and founded Rickwood Field, which was named for him. Woodward was born in Wheeling. He attended the University of the South and . . . Technology." — ELBERT G. ALLEN, *Secretary*, 11 Richfield Road, West Newton 65, Mass.

• 1904 •

News is scarce as usual. Received a welcome Christmas card from Henry Stevens. He is reported in good shape by Russell and Munster who had a nice visit with him recently. — There are still some classmates who have not retired. A. D. Smith visited Boston recently in the course of his far-flung trip around the country for the Jenkins Petroleum Process Company.

There is one death to report; Reginald Hazeltine, III. Reg was a popular member of the Class and many will be sorry to hear he is no longer with us. For many years he was in business in Chicopee, Mass. His son Ben graduated from M.I.T. in 1931. He and the family have our deep sympathy. — EUGENE H. RUSSELL, JR., 82 Devonshire Street, Boston, Mass. CARLE R. HAYWARD, Room 8-109, M.I.T., Cambridge 39, Mass.

• 1905 •

As I write these notes I have the honor and have had the pleasure of being your secretary longer than anyone else. Bob Turner, our first secretary, served during the school year 1901 to 1902. Bob Lord took over in 1902 and did a grand job for five years. Grove Marcy was elected secretary in June, 1907, re-elected many times, passed the baton to Ros Davis in October, 1922, after a service of love of 15 years, four months. Ros did a masterful job from that time until June, 1935, just short of 13 years. Then as I stated in my maiden effort in our *Thirty Year Booklet*, "the mountain labored and brought forth a mouse," said "mountain" being my campaign managers (thanks for the confidence, Grove and Hub) and the "mouse" being yours truly who has now tried to keep up with the work of a series of splendid predecessors for a period of 15 years and six months. I have never tried very hard to resign because I liked both the job and the salary. Previous secretaries know what a job it is to get '05 men to write about themselves so that there may be news for class notes nine months of the year. That phase of the work gets more

difficult as we grow older, but by dint of considerable prodding, threats of scandal writing, and so forth, your news letters have helped me maintain a fair record with the class notes editor of The Review. The rest of the work is more or less routine, helping to engineer reunions, operating as a clearing house on vocational, avocational, even real estate problems, and so on. Thanks a lot, fellows, for helping me keep peped up the old '05 spirit.

News is again at a premium. However, this month in response to a few frenzied appeals, this reply came from Howard Edmunds, VI, 165 East 83d Street, New York 28, N.Y. "When you come to the point in a novel where it says, 'They married and lived happily ever after,' you do not look for anything of interest after that. So it is in my case; of course, we have had our ups and downs — sunshine and showers — like everybody else, but really nothing to make a story of. No children, no grandchildren, but still plenty to occupy one's time and energies. For instance: I have been sporadically inventing things all my life. My batting average of successes to total attempts is low. At the moment, I have just finished the designs and pilot model and filed a patent application on an attachment to drafting boards by which isometric and in fact any axonometric drawings can be made. You may hear of it again, and then again, you may not. I see Norman Lombard occasionally. He is very active in politics in support of the Republican party. We chat about the old days when Copley Square was the center of our universe."

A postal card from the Landers family indicates that they are comfortably settled in Dallas, Texas (1502 Pratt Street), where Maurice has set up an office as patent attorney. Roy Walker (Hiram L.) II, reports moving from Philadelphia to Indian Lodge, Port Indian, R.D. 1, Norristown, Pa. Whether this indicates retirement from his position with Lanston Monotype Machine Company, where he started in the summer of 1905, or just another house-reconstruction job, which Roy and Ted seem to revel in, is not known.

Ted Steel, VI, whose change of address to Valparaiso, Ind., (Del Vista Drive) excited curiosity, writes as follows: "No, I am still keeping busy and interested with extra professional activities. Our move to Valparaiso (from Chicago) was on the horizon (mixed metaphor) when we left Washington. We have built a little one-story house suitable for our ages, tastes and modest financial circumstances on a hilltop next to our son and his family. Now we shall discover how we fit into rural life in an Indiana County Seat with Chicago not so far away — say 50 miles to the 'loop,' and the Lake Michigan drives 30 miles to the north. 'Valpo' is on U.S. Route 30, easy of access to travelers by automobile. Our latch string is out, or will be as soon as we can get a little settled. We moved in on October 11."

Chester Shaw, VI, (Course VI seems to be on the job this month) writes from Saint Cloud, Fla., that he dragged a 33-foot house trailer 1,500 miles from his old home in East Bridgewater, Mass., without mishap and without experience. Chet has started a trip which, according to his

preliminary report, is both nomadic and endless.

An 8-inch by 10-inch enlargement of the photograph taken by Ed Barrier at our 45th reunion at Oyster Harbors last June is being mailed to every family represented at that reunion. This shows 39 faces and is a very good reproduction. A key is being furnished for identification. Others may receive a copy by sending \$1 to your Secretary. — FRED W. GOLDFTHWAIT, *Secretary*, 274 Franklin Street, Boston 10, Mass. SIDNEY T. STRICKLAND, *Assistant Secretary*, 69 Newbury Street, Boston 16, Mass.

• 1906 •

The following is from Tom Hinckley dated December 9: "It was nice of you to 'retire' me some 20 months before the official date but no doubt you read my thoughts. I shall probably get out before August, 1952. Mrs. Hinckley and I plan to spend at least one day with 1906 at the Snow Inn, depending on conditions at that time." Your Secretary's face should be red as this is an instance of the danger of hunch reporting. Classmates will recall that in the December Review we assumed Tom had retired because he requested his mail sent to his home address in Cambridge.

Apropos of retirements, the following from Abe Sherman under date of December 9: "After almost 43 years with the same firm, I'm retiring at the end of the year. Right after Christmas we expect to start to Florida for three months, but this year will not be at our old apartment. Friends are spending the winter in Mexico and they have asked us to occupy their home. If any of the classmates happen to be in or through Sarasota, they will be welcome to look us up at the Chas. L. Peterson place on Boulevard of the Presidents at Cleveland Drive, Lido Beach, Sarasota. I like the choice of the Snow Inn for the 1951 reunion, knowing it well as I do. I think a better choice would have been hard to find and I suppose only a few will find it inconvenient to attend after the Technology festivities rather than before. We can envy Henry Darling his choice of Wiscasset to settle down; it's about the prettiest town and location I know." The favorable comments on the Snow Inn in Sherman's letter were most encouraging to the Secretary and should reassure any who had doubts as to our choice for the 1951 reunion.

A Christmas card was received from Jack Norton postmarked Tryon, N.C. Jack advises that he and Mrs. Norton came to Tryon early in November but were coming north to pack up and return to Tryon sometime in January to make it their permanent home. — George Hobson, who is now living in South Portland, Maine, included the following information on his Christmas card: "Guess old age is really getting me down, at least to the extent that I'm content to stay around home and have no desire to travel." In view of all the traveling George did while in the United States Army, he can be excused for being contented to stay at home.

The Schenectady, N.Y., *Gazette* of November 4, 1950, quoted some extracts from a radio broadcast of the General

Electric Farm Forum, Station WGY, given by Sherman Chase of our Class. He spoke of the effect of water pollution on the rivers, lakes and streams. Sherman is one of the partners in the firm of Metcalf and Eddy, consulting engineers of Boston.

Thanks to Stewart Coey for sending a clipping which should be of much interest to classmates. The New York *Herald Tribune* of December 15 contained a picture of Otto Blackwell and a notice that he was to be awarded the 1950 Edison Medal at the mid-winter meeting of the American Institute of Electrical Engineers held the latter part of January at the Hotel Statler, New York. The award was to be made for "his pioneer contributions to the art of telephone transmission." Otto retired last year after 43 years with the Bell System during which time he obtained 22 patents on improvements in telephone communications and held various posts both with the American Telephone and Telegraph Company and the Bell Telephone Laboratories and at the time of his retirement was assistant vice-president of the American Telephone and Telegraph Company. The Edison Medal is the highest honor that is awarded by the American Institute of Electrical Engineers and Otto's name will be included on the list with Pupin, DeForest, Bush and other outstanding engineers and scientists who have contributed to the advancement of electrical engineering.

Sam Ware, XIII, and Mrs. Ware obtained some publicity in connection with the recent elections in Massachusetts as their daughter, Attorney Martha Ware, who was a candidate for representative to the Legislature in Boston from the Fourth Plymouth District, carried on her campaign while a patient at the Children's Hospital in Boston. Miss Ware was stricken with polio shortly after her nomination. Miss Ware has served her home town of Abington as a selectwoman and has also been assistant clerk of courts. She graduated from Portia Law School in 1941. The Secretary regrets he cannot say whether or not Miss Ware's campaign was successful.

The Secretary regrets to report the death of another classmate. In this case it is one of the members of the loyal Boston group who had retained his interest in Technology and who could always be counted on to be present at class affairs. The classmate referred to is Henry A. Ginsburg, VI. Henry passed away suddenly in Miami, Fla., on December 13. His death was occasioned by a heart attack, which was not unexpected as he had been suffering from heart trouble for a number of years. After graduation, Henry was with the New England Telephone and Telegraph Company for a while and then spent some time in the patent office in Washington. Later, he returned to Cambridge and went in the mercantile business with his father who operated a department store in Central Square, Cambridge. Henry and his brother were partners in the business and Henry remained active in it up to the time of his death, although for the last few years he had been working only part time on account of his physical condition. He lived in Cambridge for the greater part of his life

but in 1948 he moved to an apartment in Brookline. The last few years he spent his winters in Florida and had been there approximately 10 days this year when he passed away. He is survived by his wife, whom classmates will remember as having attended the class reunions, and a son and a daughter. The Secretary feels a sense of personal loss in Henry's death and will miss his interest and loyalty in class affairs.

We have already referred to the 1951 reunion previously in these notes; but before closing, classmates will be interested to know I have received a letter from the Snow Inn confirming the dates of June 12, 13 and 14. So be sure and reserve these dates because by the time you read these notes it will only be four months away. To those who have attended previous reunions, no further urging will be necessary. To those who have not attended, won't you plan to be with us this year and get the satisfaction that comes from renewing the Technology associations of 45 years ago? — **JAMES W. KIDDER, Secretary, 215 Crosby Street, Arlington 74, Mass.** **EDWARD B. ROWE, Assistant Secretary, 11 Cushing Road, Wellesley Hills 82, Mass.**

• 1907 •

Floyd Naramore has written a note to me telling of his having completed a three months' trip by air around South America during last spring. He writes: "The memories of the 1947 reunion are still fresh and I hope to be with '07 in 1952." — During last summer, Don Robbins ended his association with the Cumberland Machinery Corporation of New Bedford, Mass., where he had been vice-president, and is now on the retired list. He still has two directorships which, as he says, keep him in touch a bit with business activities. He and his wife made an automobile trip to the Pacific Coast during last summer visiting his younger son who holds a degree of master of science from M.I.T., Class of 1940, in Course XV, and who is with the Campbell Soup Company at their plant in Sacramento, Calif. Don's home address is 85 Mathewson Road, Barrington, R.I. — Under date of December 12, I received a letter from James L. Walsh of our Class who is president of the American Ordnance Association, Mills Building, Washington 6, D.C., in which he regrets his inability to have attended our class dinner in Cambridge during last November and in which he writes: "Ever since the start of the Korean campaign my time has not been my own. I have had some interesting experiences, many of which cannot be mentioned in correspondence."

Under date of November 14, I received a letter from Sam Very of Tucson, Ariz., telling again of the status of the project that he and his wife have largely sponsored which has taken definite form so far in a joint resolution enacted by the legislature and the governor of the state of Arizona having to do with a plan looking to the advancement of international peace. As any such plan is of definite interest to all of us, I give below a portion of this joint resolution as embodied in H. J. R. 1, introduced to the Arizona Legislature by the Committee on Petitions and

Memorials and as approved by the Governor of Arizona on March 10, 1947. Sam writes that this measure was sent to the President of the United States and was studied by the State Department where it still rests without presidential action: "Whereas, lasting peace is desired by every nation and by all peoples. There is no friendly democracy that would not support any international program capable of effecting and maintaining that great objective. Something is preventing international peace-planning instrumentalities from formulating such a program. It is the desire of all sensible people throughout the world to discover the obstruction, and to remove it. It is the belief of many that the principal difficulty is the inability of adults to understand ideologies foreign to those of their own persuasion, even those of friendly nations professing democracy and desiring international amity. It is believed also that the most feasible means of correcting this defect is international education for peace, devoted to fostering universal understanding, friendliness and good will among all nations which believe in the four freedoms and hold the conception of democracy accepted in the United States. This end can be effected only by large scale international educational interchanges in elementary and secondary grades, between the qualified democracies of the United Nations. The first practical step toward the accomplishment of this aim must come from an aroused public opinion in the United States, crystallized by proper direction. It is the imperative duty of the Federal government to take the initiative in arousing and directing such public opinion." — **BRYANT NICHOLS, Secretary, 23 Leland Road, Whitinsville, Mass.** **PHILIP B. WALKER, Assistant Secretary, 18 Summit Street, Whitinsville, Mass.**

• 1909 •

F. Gardiner Perry, VI, who has recently joined Utopia College of Industrial Administration at Eureka, Kansas, writes us an interesting account of his experiences and his family: "I am out here this year for the Babson interests as dean and resident director of Utopia College where we are running an interesting experiment. The courses we are giving here are identical with the first year courses at the Babson Institute of Business Administration at Babson Park, Mass., which, as you know, gives the degree of bachelor of science to those who survive the three years of intensive work. However, since the classes here are smaller, we can give more individual guidance and instruction than is possible at Wellesley with the larger groups which are in attendance there."

"As to my past movements, some seven years ago I severed my official connections with the Babson interests when I resigned as the vice-president of the A. P. W. Paper Company of Albany, N.Y., in order to take the newly established position of executive secretary of my National Church organization, the General Convention of the New Jerusalem. However, I soon came back into the Babson fold in part through becoming a life member of the corporation of the Babson Institute, thus coming into closer contact with other good Tech-

nology men in the persons of Mr. Babson '98, himself, and Edward Moreland '07 who are also members. I am fortunate also to be serving with our good friend Walter Humphreys '97 as one of the trustees of the Hahnemann Hospital, Boston, of which he is president.

"Mrs. Perry has just left Kansas for Boston to assist at the arrival of another grandchild at our daughter's, Mrs. Dexter Nichols, who lives in Needham. Our son, Frederick, Jr., M.I.T. 1943, is living in Wayland, Mass., and has three boys including a set of twins. He, as you may know, is with Arthur D. Little, Inc. Our youngest son, John, is a sophomore at Northeastern University, so you see the family is growing up."

An obituary notice in the *Boston Herald*, December 13, told of the death of Colonel Rudolph W. Riefkohl, II, 65 years old, on December 11, of a heart ailment at Surfside, Fla. Rudolph, who retired in October, 1945, after 34 years of distinguished service in the Army, was born in Maunabo, Porto Rico, and at the age of 13 prepared a map of the Island which was used for the landing of American troops in the Spanish-American war. He prepared for the Institute at the Concord, Mass., high school, and in 1911 was commissioned a second lieutenant in the Coast Artillery Corps. He served in World War I and afterward in various capacities in the quartermaster department and was assigned foreign duty in Puerto Rico and Panama. During World War II, he was colonel in the General Staff Corps in the Third Service Command with headquarters at Baltimore, Md. In this position his duties were unusually arduous since they involved the supplies for the rapid expansion of the Army, supplies to the military, and activation of large camps. Always modest, Rudolph belittled his activities as "fighting the war in a swivel chair." However, in 1945, he was awarded the Service Command Certificate of Commendation for "outstanding and meritorious service." On January 7, 1947, he married Mrs. Aimee Preston Wade of Detroit, Mich., née Aimee Preston of Ponce, Porto Rico, who survives. In October of that year they were "at home" in Surfside, Fla. At one time he was mayor of Surfside. Burial was in the Arlington National Cemetery. From the class secretary's point of view, Rudolph was a blessing in that he was most co-operative in sending us news. Notes concerning him may be found in the *Reviews* of January and April, 1945, and November, 1947. The class extends its sympathy to Mrs. Riefkohl. — **PAUL M. WISWALL, Secretary, Box 125, Glen Ridge, N.J.** **CHESTER L. DAWES, Review Secretary, Pierce Hall, Harvard University, Cambridge 38, Mass.** **Assistant Secretaries: MAURICE R. SCHARFF, 366 Madison Avenue, New York 17, N.Y.; GEORGE E. WALDIS, 1606 Hinman Avenue, Evanston, Ill.**

• 1911 •

At this writing, we have received class dues and reunion-expectancy slips from 26 more '11 men, which, added to the report made in the January class notes, show very rosy prospects for our 40-year reunion at Snow Inn, Harwichport, on Cape Cod. Totals now indicate chances excel-

lent for 40 classmates, involving 71 persons; chances fair for 49, involving another 71 persons; and poor chance of attendance by 39 classmates.

Four men who figure they'll surely be there with their wives are: Joe French, IV, Detroit; Joe Harrington, VI; Nat Seeley, II; and Walter Welch, VI, all from Manhattan. Four more think there's a fair chance they and their wives can attend, including: Cal Eldred, VI, and Ned Hall, II, Bay Staters; Selbie Seligman, III, New Yorker; and Ed Stimpson, X, Newburgh, N.Y. Three stags also indicate chances are fair: Dippy Allen, II, now at Elizabeth, N.J.; Ban Hill, I, Baltimore; and Charlie Hobson, X, Charleston, W. Va. Sorrowful regrets are at hand from 15 classmates who say their chances of attending are poor: Stanley Bates, I; John Bowman, XI; Sam Cornell, XIII; Norm DeForest, III; Gus Frigon, VI; Albert Gardner, II; Tom Haines, II; Theo Lafreniere, XI; Ray Lord, VI; Fat Merrill, I; Frank Osborn, III, who adds there is just a chance he might be able to get up to the States from Chile at that time; Art Pillsbury, I; Carl Schafer, XIII; Ed Woodward, VI; and Erv Young, I.

Our sympathy certainly goes to Paul Kellogg, IX, at Montreal, where Fate has dealt him another heavy blow, witness the following: "On November 15, after a two-week battle with a couple of heart attacks, Beth gave up, and once again I find myself alone in the world. This was quite unexpected as Beth had been in good health, was not overworking, and there was no indication that we were so near a tragic event of this kind. It is too early to say what effect this will have on my plans to attend the next reunion. Beth and I were both looking forward to this and were already pushing other things aside so that nothing would interfere with those dates. I guess we shall have to let things take their course for a month or two before I come to any judgment. I shall try to make it and I hope the Denison family has a Merry Christmas and a Happy New Year and that you may be spared many years for each other."

Christmas cards were received from many of you and Sara and I certainly appreciate hearing from you. One outstanding card is the one from Monk de Florez showing him piloting a jet plane with wings marked 1950 and an old-time wing superimposed, marked 1912. Don and Lois Stevens and their son, Carver, photographed in front of the post office at Fort Yukon, Alaska, provide the motif for their card this year. The O. W. Stewarts' tapering-off signature to form a tree was unique — plus.

A December 5 editorial in the Boston *Globe* urged support of Northeastern University's \$1,500,000 library fund campaign, inaugurated by President Carl S. Ell, XI. On December 13, Fred Daniels, VI, formally presented to the Worcester Natural History Society the deed for 340 acres of land in Rutland, Mass. The land and buildings on it, a gift from Fred and his wife, Eleanor, will allow for expansion of the school of forestry and conservation operated last summer for the first time by the Society. As we told you last spring, when reporting the projected opening of

this new F. Harold Daniels School of Forestry and Conservation, it is believed to be the first school of its kind in this country. A very foreseeing act, Fred Sara was listening to WBZ disc-jockey, Carl DeSuze, one morning recently and heard him refer to a party he had attended at the Dedham home of Ken Faunce, VI, and his wife, DeSuze being most impressed by the Faunces' Japanese butler.

Dippy Allen, II, writes: "Have temporarily deserted my woods and fields and St. Leonard's Creek, Lusby, Md., to assist the gas company here (Elizabeth, N.J.) in changing from manufactured to natural gas. Job is going to take the better part of the winter. Temporary address: Hotel Winfield Scott, Elizabeth, N.J." Gus Frigon, VI, formerly chairman of the corporation of L'École Polytechnique in Montreal, is now an executive of the Canadian Broadcasting Corporation. He writes that "work is heavy, health not perfect, so reunion chances poor." His address: Radio-Canada, Post Office Box 6000, Montreal, P.Q., Canada.

Norm DeForest, III, writes from Maitland, Fla.: "Being in the citrus fruit business, my seasonal activity is October 1 to June 1, so it is very doubtful that I will get to New York City, where I go every summer, much before July 1. That's my hard luck for I'd surely love to attend our reunion." Ned Hall, II, whose permanent address is 112 High Street, Newburyport, writes from a temporary address, 1903 Kalorama Road, N.W., Washington 9, D.C.: "I've spent a large part of November in the hospital here in Washington. Apparently getting back in condition again now. I don't dare, under present conditions, to forecast my movements as far ahead as June, but will surely be with you if possible." As we told you in last month's notes, Ned has been assisting the Office of Engineers in a civilian capacity since the early part of 1950.

Ban Hill, I, writes from Baltimore that even if unable to attend our June 8-10 reunion, he certainly hopes to attend Alumni Day, Monday, June 11. From Charleston, W. Va., where he is plant superintendent for Barium Reduction Corporation, Charlie Hobson, X, writes: "I plan to be there at least part of the time. Would like to try a round of golf again with Seligman and Minot Dennett. Don Bakewell, alas, won't be there. Both the children decided they had to have new houses this year, so I've been in the real estate end in a big way. Five grandchildren now."

Nat Seeley, II, writes from Shippian Point, Stamford, Conn., that he and Louise certainly plan to attend and proudly boasts that he has persuaded fellow Chi Phi's, Doc Davis, VI, to come on with his wife from California and Pete Caillard, VI, and his wife to come from Washington, D. C. He says that Andy Fabens' 10 and his wife plan to come up from Florida for Alumni Day and Nat further is trying his best to persuade Norman DeForest and his wife to attend our 1911 party, June 8-10.

With regret, I heard from Erv Young, I, that his wife is still seriously ill after three weeks in the hospital at East Orange, N.J. We certainly trust she will be

much improved in health by the time these notes appear in print.

Definite plans for the 1951 Alumni Fund campaign, scheduled for continuation early this spring after concentrating on solicitation for the M.I.T. Development Program during 1950, have not been announced, but they will be before these notes are published and, as always, 1911 will back it to the limit. — Be on the lookout for an initial reunion edition of *Thelevene* in March, in which Reunion Chairman Aleck Yereance, I, will announce his committee make-up and give you all the latest news concerning our 40-year reunion at Swan Inn, Harwichport-on-the-Cape, during the second week end in June. See you there! — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Gardner, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford 55, Mass.

• 1912 •

Charles and Olga Tuller expected to move before Christmas into the new home that they built incorporating all the features they want to have when Charley retires. Their new address is 1627 Houstonia Avenue, Royal Oak, Mich. — Max Levine of Honolulu writes that he really does hope to be present at the 40th reunion in 1952 even though he could not make it in 1949. It is time to begin thinking about 1952. How about sending in your ideas now? — FREDERICK J. SHEPARD, JR., *Secretary*, 31 Chestnut Street, Boston, Mass. LESTER M. WHITE, *Assistant Secretary*, 4520 Lewiston Road, Niagara Falls, N.Y.

• 1914 •

Your three class officers report collectively and individually that they have joined the grandfather class. The first is Ross Dickson, whose daughter, Mrs. Villott, became a mother this fall. Charlie Fiske's daughter, Mrs. John M. Thompson, 3d, became the mother of a daughter, Joanne, on November 8. Your Secretary's daughter, Mrs. Raymond V. Randall, gave birth to a son on December 12.

At the National Association of Manufacturers' annual meeting in New York, your Secretary had a chance to chat with Norman MacLeod, who has been a regular attendant at these meetings. Norman reports that the national tool industry is picking up with great rapidity, and production rather than orders has now become the problem.

Ray Dinsmore made the New York *Herald-Tribune* again. Ray, it will be recalled, is vice-president in charge of research and development of the Goodyear Tire and Rubber Company. Ray was quoted as being critical of the fact that insufficient rubber had been stockpiled. He stated that any long war would require at least a million tons of rubber a year, of which 25 per cent would have to be natural rubber. In addition to the shortage of natural rubber, he characterized the present situation of inventories of synthetic rubber as desperate. — Word has been received from retired Admiral Tatsuo Furuchi that he has been elected a director of Midoriya Electric Company at Tokyo.

On November 16 we lost another of our classmates, James A. Creighton. He was superintendent of the steel division of Bethlehem Steel Company's Lackawanna plant and had been associated with steel metallurgy ever since graduation. Creighton came from Thomaston, Maine, and entered the Institute from Bowdoin College. He married Helen Mills Copeland on June 28, 1919. He is survived by his wife, two daughters, Mrs. Seth A. Abbot and Mrs. Emil J. Willmetz, and a son, James. — H. B. RICHMOND, *Secretary*, 275 Massachusetts Avenue, Cambridge 39, Mass. Ross H. DICKSON, *Assistant Secretary*, 126 Morristown Road, Elizabeth, N.J.

• 1915 •

The Class gives Jack Dalton a "regular M.I.T." for his splendid work as chairman of the C.F.D. The \$20,000,000 goal was exceeded. Jack has given a great deal of time and effort to this committee and the result of the campaign is a great satisfaction to all of us. Bill Campbell, Executive Director, has been tireless in his efforts in securing sizable contributions. 1915 is proud of both these classmates and gives them well-deserved congratulations.

One of our most popular and most active classmates is slowly but surely recovering from a long, hard and serious siege of illness. Apparently in fine health, Gene Place was suddenly stricken with a series of black-outs which resulted in a critical brain operation on December 7 at Massachusetts General Hospital, Boston. Failing to improve from this, he was operated on again as an emergency on December 12. On December 15 it became a "question of hours." But good old Gene fought his way out of it and with his indomitable spirit has staged a wonderful comeback. At this writing, he is still on the danger list in the hospital; but by the time you read this, he will appreciate a cheerful card or note from you. So, get out that old 1915 spirit and send Gene a cheerful and encouraging message. His home address is 304 Berkeley Street, Boston 16, Mass. We, here in Boston, have been dreadfully upset by all this sadness; and although there was nothing we could do for Gene, we kept in touch with Ruth and did all we could to comfort and cheer her. Their son Bill ('43) flew on from the Coast to be here during the emergency.

Handsome Bill Campbell may be moving nearer to pictures, at that Bill was recently named a vice-president of Food Machinery and Chemical Corporation, San Jose, Calif. Congratulations and success to Bill. — More honors for '15 men: Ralph E. Curtis, President and Treasurer of the Curtis Universal Joint Company, was elected secretary of the Kiwanis Club, Springfield, Mass., in November. Congratulations to Ralph.

Mary Eleanor Runels, daughter of Chester and Margaret Runels, was married to John De Mallie on December 2 in the Eliot Union Congregational Church, Lowell, Mass. Mary studied at Colby Junior College and the Modern School of Fashion and Design. During the war, she served with the Marine Corps, Women's Reserve. John studied at the University of Rochester and the graduate school, University of Michigan. During the war, he was a lieu-

tenant in the Navy. They will live in Buffalo, N.Y. All the best from our Class to this young couple. — On November 25, in the chapel of the Presbyterian Church, Lockport, N.Y., Ben Neal and Mrs. Loretta Patterson were married. Our very best wishes and congratulations to Loretta and Ben.

The successful reunion has brought out Sol Schneider's hidden letter-writing talent. Keep it up, Sol, with our assurance we were all glad to see Ann and you and give you full credit for being there and promise you the additional "loot" of a beautiful plastic ice bucket when Jac Sindler completes his mold and molding. From 310 Washington Street, Haverton, Pa., Sol writes: "I am a little slow in adding my few humble words to those of the other boys who wrote to tell you what a wonderful time was had at Cape Cod at our 35th reunion. Ann and I also want to thank the guilty personnel for the nice, homelike cocktail party at the Copley Plaza. This was her first time at one of these affairs and she certainly enjoyed meeting our classmates, especially our class secretary, and hopes she will be invited to future cocktail parties. By the way, I noticed a typographical error in the 1915 Class Notes in the November issue of *The Review*. You reported 62 members attended the reunion — and only 61 names were listed. And who should be omitted? You guessed it, yours truly. To make sure that I was there and just did not dream it, I looked at the class picture taken at North Falmouth, June 10, 1950, and sure enough there I was standing next to Alton Cook and in front of Tom Huff. When some of the local boys ask me how come, I can always show them the picture to back up my statement that I was at the 35th affair. That brings up another question, perhaps I was not on the mailing list for the additional "loot" that is to be distributed when you get it. I certainly hope that I did not miss out as Ann and I still talk about the very fine souvenirs given at the cocktail party. Ann and I shall be pleased to see you any time you are in Philadelphia, so just call us on Hilltop 6-0989 to say you are in town."

To close this month's column, let's direct all our thoughts, hopes and interests to "help Gene." — AZEL W. MACK, *Secretary*, 40 St. Paul Street, Brookline 46, Mass.

• 1916 •

With world conditions in such a turmoil, sources of enjoyment are becoming few and far between; but thanks to your wonderful co-operation, we find that we can look forward with a great deal of anticipatory pleasure to preparing this monthly column. Keep up the good work and then let's top it off with 100 per cent attendance and a bang-up affair at our 35th reunion.

We recently had a note from Herb Pieper in Scarsdale, N.Y., who spent only one year at Tech 'nology. He is now retired after having spent his business life in the securities business mostly trading in securities for his own account. He has two daughters — the older, a secretary, and the younger, a senior at Wellesley. — And welcome word comes from Earl Hauman

in Niagara Falls, N.Y. He is vice-president and general manager of the Exolon Company in Tonawanda, manufacturers of artificial abrasives. He, also, has two daughters, both married, and one grandchild. We were pleased to hear that he expects to attend the 1951 class reunion.

We have the following note from Earl Edwards: "After leaving M.I.T., I went to Flagstaff, Ariz., to the Lowell Observatory to make observations, and so forth, on an unknown planet. Dr. Lowell had been working on this for years, and it wasn't until years after his death that it was discovered by this observatory and was called 'Pluto.' In 1922, I returned to Boston and went into the sales agent business and have been in the same ever since. I represent several companies in New England. Was married in 1925; have two boys, one just married, who was in the service, and the other now going to Boston College."

Morty Favrot is doing big things in a big way down in New Orleans. A recent reply to our request for news brought the following from him: "By evolution, I succeeded to my father's architectural reputation and practice. It covers much of south Louisiana, including at present a number of large hospitals such as the New Orleans Veterans' Hospital associated with a Washington firm. I have recently been appointed, in association with F. D. Parham, architect for the New Orleans Civic Center including new city hall. My firm is Favrot, Reed (deceased January, 1950), Mathes and Bergman; and Parham's firm is Goldstein (M.I.T. '04), Parham, and Labouisse (M.I.T. '33). This makes it 50 per cent M.I.T. I am campaign chairman for the present M.I.T. drive in New Orleans. Am happily married since 1926 to Helen Parkhurst of Indianapolis and have three children, the oldest a junior in architecture at Tulane. Many tell me I have the loveliest wife and the loveliest old home in New Orleans; 90 years old and surrounded by magnolias (the home, not the wife). Who am I to debate the matter!"

A welcome little note from Walter Goodwin indicates that from graduation time to 1931, he was a draftsman in the R. E. department in the New York, New Haven and Hartford Railroad in Boston. From 1932 up to the present time, he has been an assistant engineer in the Department of Public Works and Highways for the state of New Hampshire in Concord. He says he is still happily single and lists among his favorite sports, volley ball, parlays and mutuels, and bingo.

A letter from Hank Smith in Chatham, N.J., reads: "Your persistent but tactful follow-up has persuaded me to emit a little of my history; and so I subjoin a thumbnail sketch of my activities since the Institute gave me the benefit of the doubt and a sheepskin. The summer of 1916, I remember principally for graduation (with a strong sense of relief), for the dedication of the new Institute buildings in Cambridge, and for a rather indolent four months of chauffeuring a Cadillac while I enjoyed the letdown from the grind of the 'Tech on Boylston Street' and deferred connecting with a regular job. Toward the close of the year when my conscience be-

gan to prod me into really going to work, I found that technical positions were quite plentiful and finally I had the choice of four, and so, by what was practically a tossup, I found myself in Arlington, N.J., in January, 1917, in the capacity of a chemist with the DuPont Pyralin Works. The almost chance selection of this position was a good example of how much can hinge on so little, for in Arlington I met Dorothy Whyte who was willing to take a gamble on me, and we were married in September, 1918.

"During the summer and until after the Armistice in 1918, I was at the nitrate plant at Muscle Shoals, Ala., and learned that there is probably no dirtier job than handling cyanamid. Then I filled in a year or so as an assistant to the plant manager of the Egyptian Lacquer Manufacturing Company in Kearny, N.J. Another move in the spring of 1920 took me to the engineering department of the Edison Storage Battery Company in Orange, N.J. This was a shift from chemical to electrical work, but was not out of line with my training at the Institute, for old Course XIV (Electro-chemistry) was a sort of straddle of electrical and chemical engineering. One of the by-products of the depression of 1921 was my unemployment for several months. Then I got interested in radio, which was in its infancy, with Charlie Brown '13; and for a while it looked as though we were developing a real manufacturing business with a future. We soon found, however, that we were hamstrung by the complexity of the radio patent situation; and so we made our exit early in 1923, having thankfully avoided any legal entanglements. In February, 1923, I joined the electrical department of Underwriters' Laboratories, Inc., in New York City, and I'm still there. As a member of a group of engineers devoted to the elimination of losses resulting from fire, casualty, and crime, I have found the work interesting, enjoyable, and satisfying. It is one of the few lines of endeavor where one is paid for being altruistic. I have become a combination of scribe and engineer and am presently engaged in preparing, editing, and publishing the laboratories' *Electrical Standards*.

"We reside in Chatham, N.J., which we enjoy very much as an almost rural community. It's a rather long commuting drill to the Butterick Building in New York, but I'm a strong rooter for the Lackawanna Railroad. We have had two daughters and have lost one. Sylvia Jeanette is now a junior at Mt. Holyoke College. Dorothy and I had the privilege of attending the Mid-Century Convocation last year, and we count that as one of the outstanding events of our lives." A very interesting letter, Hank, and one which we hope will encourage others who have been holding back for one reason or another to write in with news for the column.

One of these days we hope to see a new best seller in the bookstalls under the title, "How to Retire Before You Have To!" and perhaps Maynard Guss could be the author, for he writes: "After 32 years with the Standard-Vacuum Oil Company (26 in China, six in New York City), I retired in 1948 in Santa Barbara, Calif., where I built a small home and am now busy landscap-

ing it." Says he hasn't "met any of the boys" out there yet. We're hoping for an elongated story of his life in China.

Word from the Deep South was received in a letter from Kem Dean in which he wrote: "It was good to hear from you and I really wanted to write to you before this time. However, as you may have read in the papers, the cotton business has been rather hectic this season, mostly caused by a short crop and government restrictions on exports. Ralph Bennett is the only member of our Class I have seen. Lev Lawrason '17 stopped off for 15 minutes at the depot on his way back to California last August. It was good to see him and he looks just the same. Ralph Bennett lives in Shreveport where he is with United Gas Corporation. I am trying to prevail on Ralph to take in our 35th reunion this June and I really think he is giving it serious consideration. Both of our daughters have married. The younger has a little boy one-and-one-half years old and they live in Shreveport. The older daughter has a little girl born in March, 1950. They live in Houston. It's great being a grandparent! Looking forward to seeing you and Harold in June. . . ." Caught any burglars lately, Kem?

We had a short note from Walter Littlefield in which he writes that he is still a trustee of a trust (Littlefield Trust) that owns and operates real estate, that he is still spending his spare time as finance committee chairman for a charitable home in Roxbury, Mass., and that he is also serving as a trustee of the Roxbury Latin School. He closes his letter by saying: "Having wandered far from engineering fields, I see no M.I.T. '16 classmates. Walt is in Room 97, Boston Fruit and Produce Exchange, Boston, and it might be nice if some of us dropped in to see him if and when we are in his area.

Newspaper clippings brought in the following items of interest: Commander Howard T. Evans, C.E.C., U.S.N.R., of 14 Waban Street, Wellesley, Mass., has received orders from the Commandant of the First Naval District appointing him commanding officer of Volunteer Construction Battalion Unit 1-1, Boston, Mass. This is a unit of the Naval Reserve comprising more than a hundred officers of the famous Seabees. Commander Evans has resided in Wellesley since 1923, and for many years has been associated with the Stone and Webster Engineering Corporation, where he is now a supervising structural engineer and handles work in connection with the planning and construction of large industrial projects. During World War I, he was a captain in the Army, and during World War II, as a civil engineer officer in the Navy, he served as officer in charge of construction of several shipyards and industrial plants which were built with government funds for operation by private industry, and was assistant officer in charge of construction of the new United States Naval Shipyard at Hunters Point, San Francisco, a project requiring the expenditure of more than a million dollars for drydocks, wharves, industrial shops and other facilities.

Another clipping tells us that Captain Harold E. Saunders, U.S.N., retired, had been awarded the David W. Taylor Medal

for achievement in naval architecture at the annual banquet of the Society of Naval Architects and Marine Engineers held in the Waldorf Astoria Hotel.

We recently reported to you on the passing of Walter Fowle and would like to take this opportunity to quote from a clipping which appeared in a local paper shortly after his death: "Mr. Fowle's passing was not surprising because of the nature of his prolonged illness, but nevertheless the news of it caused a pall of grief in many circles, particularly among the employees of the John L. Fowle Company of which he was a partner. Mr. Fowle was a very quiet man and all his acts were unostentatious, particularly his contributions to charity which were done generously but without fanfare. Through his understanding of his fellow man and his compassion for human kind, the John L. Fowle Company, of which he was the managing head for many years, was not surpassed in the entire country in the item of pleasant labor relations. In addition to his industrial duties, Mr. Fowle found time to participate in business, civic and fraternal enterprises. He was a director of the Woburn National Bank, a member of Mount Horeb Lodge A.F. & A.M. Royal Arch Chapter of Masons, Woburn Charitable Association, George A. Campbell Post 101 American Legion, Towanda Club, Y Men's Club, Vesper Country Club and Rotary Club of Woburn."

Vic Dunbar came through in answer to our request for news with the following: "No alarming news, employment same as last note, but have been transferred from Schenectady, N.Y., residency to the Boston-Lynn residency. No rents within our means, we do not like apartments, so we have purchased a small home in Swampscott. Our son, Donald, is attending Ohio State University for his Ph.D. in psychology. Received his A.B. at Dartmouth, his M.A. at Columbia. He also spent three years in World War II in O.S.S. The old folks, Marjorie and I, are still alive and kicking." Save a few of those "kicks" for the big dates, June 8, 9 and 10, Vic.

Finally, we had a long letter from Herb Ellis and find it so interesting that we feel that it should be quoted in its entirety: "I have been with the lamp department of the General Electric Company ever since July, 1916. Most of these years have been spent in Cleveland although I did spend a year and a half in the first war and then a period of two years at the Youngstown Lamp Works of G.E. at Youngstown, Ohio. My first five years with the company were in engineering work and then changed to manufacturing when I went to Youngstown in 1922. I was transferred back to the home office at Nela Park, Cleveland, to work on production planning and control methods resulting in my becoming the general production manager for what is now all 20 G.E. lamp factories scattered all over the United States. I married a Cleveland girl in 1921 and we have two children. Our son, David, graduated from Case Institute of Technology in electrical engineering and is now in Detroit working for General Motors Corporation. He went into the Army immediately after graduation from University School here and spent over two years in the last war before

starting college work. Our daughter attended Laurel School here and is now a sophomore at Wells College. Willard Brown is the only 1916 man I see often. Willard, you perhaps know, is the manager of our engineering division here at Nela Park. I will suggest to him that he contribute some news if he hasn't already done so recently."

As we close this column, we can't help thinking that we are one month closer to that day when we will be seeing in person and talking over old times with those persons about whom or to whom we are writing. That day should be the day above all days, the opening day of the 35th reunion. We hope you are looking forward to it with as much enthusiasm as we are. One last reminder about your letters; keep them coming! — **RALPH A. FLETCHER, Secretary**, Post Office Box 71, West Chelmsford, Mass. **HAROLD F. DODGE, Assistant Secretary**, Bell Telephone Laboratories, 463 West Street, New York 14, N.Y.

• 1917 •

A letter received from Ken Bell tells us that "Barney and Constance Dodge, Con Coakley and I had dinner at the famous Maramor restaurant in Columbus, when attending the annual meeting of the American Institute of Chemical Engineers. We tried to get them signed up to sit at the same table for the awards dinner the next night, but they were a bit evasive. Imagine our pleasure to find Barney at the head table, as recipient of the coveted William H. Walker Award — the highest honor for a chemical engineer. The medal and scroll were given for the excellence of his papers on high-pressure reactions and other subjects published within the last two years. Incidentally, Bill McAdams is the only other one of William H. Walker's students to have received the award, so '17 did itself proud, as usual. Walt Whitman was also at Columbus, but could stay only for the first day's session.

"Ken Childs hailed me in the South Station lunchroom one morning recently, where we both enjoyed breakfast. Ken was just returning from an industry convention in New York. Gordon Russell — who is a neighbor, living on Marblehead Neck near James J. Storrow — helped me on last spring's C.F.D. campaign, but had to leave before it was over to go overseas on an extended business trip. We saw Fred Stearns and many other M.I.T. men at Northeastern University's dinner inaugurating its campaign for funds for its new library."

Further news of Barney Dodge's activities has come from Barney himself. He writes: "I am going to Europe on leave this coming term but will be teaching at the University of Toulouse in France. I have a Fulbright appointment there to help them with teaching of chemical engineering in a relatively new institute of chemical engineering just established there. I am leaving on January 20 but Connie is not going over until the first of May. The stay at Toulouse will probably be over approximately June 15 and we plan to spend about six weeks in touring around Europe visiting, in particular, Switzerland, Italy, the Netherlands and Great Britain."

Lobby has moved to the new apartment

house at 100 Memorial Drive, Cambridge, overlooking the Charles and the Boston skyline. His apartment really does overlook the Charles — it is on the 11th floor. — **RAYMOND STEVENS, Secretary**, Arthur D. Little, Inc., 30 Memorial Drive, Cambridge 42, Mass. **FREDERICK BERNARD, Assistant Secretary**, 24 Federal Street, Boston 10, Mass.

• 1918 •

Having solidly established himself as a designer of houses in the beautiful old New England tradition, Bill Wills now gets into the newspapers as a designer of some ranch-type houses — just to show the so-called moderns who have scoffed at him that their stuff is no mystery to an old master. On November 20, Bill led a seminar dealing with the ranch type for the Massachusetts Board of Real Estate Appraisers.

Frank Creedon is another architect who has been featured in these columns of recent years. Formerly Federal housing expediter, he has now been appointed to keep check on industrial plant expansions under the government's controls program. The National Production Authority says Creedon will organize a "facilities clearance staff" and direct the processing of various kinds of certificates that come to N.P.A. in connection with industrial expansion. A native of Brockton, Mass., he directed government construction of ordnance and chemical warfare plants in 1942. Then he became deputy rubber director in charge of building synthetic rubber plants. In 1944 and 1945 he was construction manager for Stone and Webster Engineering Corporation in charge of building the atomic bomb plant at Oak Ridge, Tenn. After that, he was federal expediter for a year and a half, and more recently has been construction manager for General Electric in charge of the design and construction of an atomic bomb plant at Hanford, Wash.

Belatedly comes news that on August 11, Harvey H. Brown, Jr., president of the Cleveland Hobbing Machine Company, director of several other industries and a trustee of Western Reserve University, died at the age of 58. Brown was a director of the Eaton Manufacturing Company, Enamel Products Company, Industrial Brown Hoist Corporation, and the Brush Beryllium Company. He was also a former vice-president of the Stewart Furnace Company and a director of the Guardian Trust Company. During World War II, he served as regional consultant in the Defense Plant Corporation. He was a first lieutenant in the 37th Division Artillery in World War I. After his discharge from the Army, he began his industrial career with the Brown Hoisting Machine Company, becoming treasurer in 1922. Brown was elected president of the University Hospitals in 1947. Later that year when the joint committee for the advancement of medical education and research was formed, Brown was elected vice-president of the group. He was also a trustee of Hawken School, University Hospitals and the Visiting Nurse Association.

On November 3, final rites were held in Berkeley, Calif., for Edward H. Zeitfuchs, internationally-known authority on the physical properties of petroleum products.

He had been in failing health for several months. Zeitfuchs was highly respected throughout the petroleum industry for his research work on viscosities of oil. He invented several widely used measuring devices among which were the Zeitfuchs viscometer and viscosity bath for measuring flow characteristics. He was associated with the Standard Oil Company of California for 25 years, retiring from the firm in 1946 as senior physical specialist. He continued research and development of these devices until his retirement. — **GRETCHEN A. PALMER, Secretary**, The Thomas School, The Wilson Road, Roxburyton, Conn.

• 1919 •

The December 5 issue of *Times* carried the following article: "Charles A. Chayne was elected a Vice President of the General Motors Corporation in charge of the engineering staff." — A must for all outdoorsmen is manufactured by the Blake-Cutler Corporation of Boston, Mass. This instrument, called the "Windikator," tells the wind direction — wind velocity at a glance. Arthur H. Blake also writes of a new display toy they now have on the market called the "Jo-Bo" which is appreciated by youngsters from six to 60.

We learn that E. Robert Helmrich is the deputy county road commissioner of El Dorado County, Calif. Belated congratulations are extended to classmate Herman A. Herzog on the marriage of his daughter, Elizabeth, to Robert Warren Voley of Cedar Rapids, Iowa. Both are still attending Coe College.

A recent note received from Fred Hewes relates that he is now retired and he and his wife, Claire, are in the process of moving into their recently completed home at 344 Thurston Avenue, Mountain View, Calif. He also writes that Ed Pickop, I, his wife and grown-up daughter, Barbara, visited them only too briefly on a vacation trip from Honolulu. Ed is an executive in the Territorial Department at Public Works. Richard S. Holmgren is also to be congratulated on the marriage of his oldest son, George. He and his wife are continuing their studies at the University of California in Berkeley.

James A. Howe writes that he is industrial specialist at the Mutual Life Insurance Company, 1740 Broadway, New York 19, N.Y. C. W. Hyde is working for Uncle Sam in the Signal Corps Procurement Agency. Nothing new since we last heard from Leslie A. Jackson, 1600 Gaines Street, Little Rock, Ark. He writes: "Same old cat."

Rogers B. Johnson is still with the United States Hoffman Machinery Corporation as New England institutional manager, which firm sells laundry machinery to hospitals. His son, Rogers B., Jr., is at the Harvard Business School. At the installation of officers on September 25 in Boston, S. Albert Kaufman was installed Worshipful Master of Germania Lodge of Masons at which function Harry Cikins and Hyman P. Selya were present. Ervin M. Kenison reports that they are kept pretty busy down in Washington. The Federal Power Commission assists in special studies for the Defense Department. He also writes that his son and two

daughters are married and he is developing into a first-class bridge player. Won't someone take him on?

Harold F. Marshall, a lieutenant colonel, has been Camden area chairman of the M.I.T. Development Program. He attended "Solar Heating" summer school at the Institute and, in November, was re-elected to Boro Council. He is Commanding Officer, 9317th Sqdn. (AC/W) Air Force Reserve. His Palmyra, N.J., address is: 103 Morgan Avenue. — EUGENE R. SMOLEY, *Secretary*, The Lummus Company, 385 Madison Avenue, New York 17, N.Y. ALAN G. RICHARDS, *Assistant Secretary*, 38 Carleton Circle, Belmont 78, Mass.

• 1920 •

The holiday season brought welcome word from Norrie Abbott in Providence, Chuck Reed in Cleveland and a visit with Buck Clark and Jim Gibson whose looks, I must say, belie their years. Buck is a partner in Estabrook and Company and Jim is with John Hancock Mutual Life Insurance Company where he has been for some years. Bob Patterson, who is vice-president of John Hancock, did some fine work as a group leader on the M.I.T. Development Fund campaign, as did Perc Bugbee, Al Wason and Ken Akers.

Judging by his Christmas card, Bud Cofren has a lovely old farmhouse home in Waterloo Village, Warner, N.H. Your Secretary is certainly going to accept Bud's invitation to see the place sometime when the snow has disappeared. Leo Kahn is with the Metropolitan Studios, 1695 Broadway, New York, Francis Culbertson is now at 62 Harding Road, Lexington.

With the reunion year over, your Secretary anticipates a shortage of items to fill "these here" notes. Right now, while you're reading this, take out your pencil and scribble a line to me. Don't forget that your classmates would like to have news of you just as much as you'd like to have news of them. — HAROLD BUGBEE, *Secretary*, 7 Dartmouth Street, Winchester, Mass.

• 1921 •

In four months time, the Sheldon House at Pine Orchard, Conn., will see a large representative cross-section of the Class enjoying our 30th reunion diversions from Friday, June 8, through Sunday, June 10, and then taking off for Cambridge for the Alumni Day events on Monday, June 11, and our annual class party at the Copley late Monday afternoon, just prior to the Alumni Banquet. Mel Jenney and Ed Steffian of Irv Jakobson's reunion committee have written and illustrated another attractive mail announcement on the outstanding event of the year. It answers questions which came in with the many responses to the first reunion mailing; excellent responses and most welcome support for which the reunion committee and your class officers express sincere thanks. If you did not return the questionnaire included with the first announcement, complete and return the additional copy enclosed with the second mailing. The reunion committee must know your wishes well in

advance of June and your Secretary will greatly appreciate help for the class records. Please send it in now while it is fresh in your mind, regardless of whether or not you feel certain you can attend in June. Your committee wants an indication of the attendance possibilities as you view the matter now, to be used for planning purposes only and your answer on the form is not considered a binding obligation.

As of this writing, 87 members of the Class have indicated probable attendance at the reunion and returns are still coming in. Besides those listed in this column in the December and January notes, the following also expect to be on hand: Baldy Baldwin, Scripps Booth, Vern Cole, Bob Cook, Larry Davis'22, Joe Gartland, Phil Hatch, Herb Nock, Trev Peirce and Ed Wylde. All except three courses are represented by the 87, with mechanicals, chemicals, electricals and civils leading in that order. Nineteen fraternities are represented — Phi Sigma Kappa leading and closely followed by Beta Theta Pi, Sigma Alpha Epsilon and Kappa Sigma. Mail has been returned for the following and your Secretary would like to hear from anyone knowing their present addresses: James LeGrand, John R. Oliver, Michel P. Sinelnikoff. After seeing the recent pictures of the Sheldon House and its private beach on Long Island Sound and recalling the perfect time we spent there during our 10th reunion, no one should miss this chance for an unusually good vacation. Handily located for a large portion of the Class, Pine Orchard is easily reached via car on the Boston Post Road, 10 miles east of New Haven, by turning off in Branford Village for two miles. Phil Hatch's New Haven Railroad offers many trains from Boston and New York and Irv Jakobson has suggested that yachtsmen follow his lead and come in their boats. He invites any who are interested to contact him for information on moorings, the chart to be used and other useful data. Jake is planning a sail for those who want additional activities besides swimming, golf, tennis, bull sessions and the reunion events. The reunion committee will have flying information for those coming by commercial or private airplanes.

In a letter commenting on our November notes, Dugald C. Jackson, Jr., says that credit should be given to Ted and Mrs. Rose and to George Chutter for their very considerable parts in the dedication of the Dugald Caleb Jackson Room at Technology last June. Writing from his home in Darlington, Md., Dug, who is Chief of Scientific Training in charge of the Ballistic Research Laboratories at Aberdeen Proving Ground, announces the arrival of a third grandchild, the daughter of David Jackson. Dugald, 3d, has two sons, Dugald 4th and Charles. The Jacksons also have a married daughter, Elisabeth, and a son, Daniel. Dug says he occasionally sees Whit Spaulding, Executive Vice-president of the Pennsylvania Water and Power Company, and Tom Proctor, an engineer with Glenn Martin who has a farm and beautiful home near the Jacksons. He continues: "Last June, Betty and I picked up Daniel at Bethlehem, Pa., and drove to Rufe and Madeline Shaw's home on the Delaware in Beverly,

N.J., for the coming-out party of their charming daughter, Mary. We had a visit there with George and Marion Chutter and their youngest son. Then back to Lehigh for Dan's graduation — a bachelor's degree in electrical engineering and commission as second lieutenant, Ordnance Corps, U.S.A.R. In October, we went to New Haven to see our new granddaughter and also visited Charlie and Ruth Williams at their new summer home in North Guilford, Conn. We called on the A. Royal Woods in North Haven and found Woodie and their eldest son picking apples." Dug challenges any member of the Class to equal his record of three sons and a son-in-law, all of whom studied engineering and are following the profession; and further observes that "no person is a full-fledged grandparent unless he or she has at least three grandchildren with both sexes represented."

Arthur R. Gatewood won the 1950 President's Award at the annual convention of the Society of Naval Architects and Marine Engineers in recognition of his presentation of the best paper given in 1949. Irv Jakobson sent pages from the December 1 issue of the *Maritime Reporter*, which features an illustrated account of the honor bestowed on Liz, who is chief engineer surveyor of the American Bureau of Shipping, New York City.

Pine Orchard brings memories of the last time Archie Mock joined us in a reunion and we have tried to reach him unsuccessfully. Henning J. Berg'15 of San Francisco, who has kindly offered to scout for us, says: "He lives in Marin County somewhere and is a hard man to locate as he rarely shows up at luncheons or meetings." Can anyone supply Archie's address and get him to come east this year? Norborne L. Rawlings, a retired rear admiral and former head of the shipbuilding division of the Navy's Bureau of Ships, has been promoted from assistant general manager to general manager of the Newport News Shipbuilding and Dry Dock Company, according to an announcement in the *New York Times*. He will have charge of the Virginia yard's 6,200 employees and activities ranging from the construction of a 48,000-ton superliner to the building of tanks and paper-making machinery. Winfred L. Foss of Campton, N.H., has been made the industrial agent of the New Hampshire State Planning and Development Commission, according to accounts in a number of New Hampshire papers. Most recently director, general manager and treasurer of American Machine and Metals, Ltd., Canada, Win has also held important positions with its United States associate, the George S. May Company, Chicago, and several automobile distributors. A veteran of World War I, he attended Technology and Columbia.

Walter J. Hamburger, Director of the Fabric Research Laboratories, Boston, was one of the hosts to a group of textile educators from England and Scotland on a visit to this country as exchange guests of the Textile Foundation, which sent a similar group from United States schools overseas last year. The engagement has been announced of Warren G. Dellen-

baugh, son of Frederick S. Dellenbaugh and the late Mrs. Dellenbaugh of Huntington, L.I., and Miss Jean Willard of Southport, Conn. Sincere sympathy is extended to Herman S. Kiaer and Mrs. Kiaer on the death of Mrs. Kiaer's father, the renowned Walter Damrosch. Edward M. Epstein is now with Du Pont in Old Hickory, Tenn., and Andrew Jensen, Jr., has moved from Jersey City to the Hotel Ambassador, Cambridge. William J. Sherry, President of the Sherry Petroleum Company, has new offices in Tulsa at 1001 First National Building. Addresses have been received for: Colonel Charles F. Baish, Colonel John R. Hardin, Colonel Harold E. Smyser, Charles F. Parker and Harding DeC. Williams.

Here are notes from some of those who have indicated they will attend the reunion: Allen Addicks, advertising manager of the Moore Publishing Company, New York City, is a member of the American Gas Association and president of the civic association of his home town of Great Neck, N.Y. He is married and has no children. M. Sandoval Vallarta, Professor of physics at the University of Mexico, Mexico City, is internationally famous for his work on cosmic rays and has a lengthy record in *Who's Who*. Val is married and has no children. John T. Rule, Professor at Technology, heads Course IX and also the Section of Graphics. He is a director of the Pond Village Cold Storage Company and a member of the American Society for Engineering Education, the American Association for the Advancement of Science, the American Standards Association and the American Association of University Professors. He is the author of a new book, "Engineering Graphics," being published this year by McGraw-Hill, and *Descriptive Geometry*, published by Prentice Hall in 1943. Jack and Mrs. Rule have three sons and a three-year-old granddaughter. Joseph C. Morrell, chief appraiser of the real estate firm of Albert W. Lockyer, White Plains, N.Y., is active in the Westchester County organization of the M.I.T. Committee for Financing Development. He is a member of various associations of real estate boards, the American Institute of Real Estate Appraisers; and he enjoys trout fishing and gardening as hobbies. Joe and the late Mrs. Morrell had no children. Alexander D. Harvey is president of the Paul Valve Corporation, New York City. Dan and Mrs. Harvey have a son and daughter. Edwin T. Steffian heads the Boston architectural office of the same name. He is a member of the American Institute of Architects and the Boston Society of Architects and may be found working on class reunion affairs or serving the Cambridge Civic Association when he isn't otherwise occupied with the affairs of his farm in New Hampshire. The Steffians have two sons, John, aged 17, and Peter, who is 14. Melvin R. Jenney, a partner of Kenway, Jenney, Witter and Hildreth, Boston patent law firm, heads the reunion publicity committee. Mel is secretary of the Boston Patent Law Association and says he can be found on all local fund raising committees for various and sundry good causes. His proficiency at golf (and horseshoes, at your Secretary's expense)

he now claims to be diverting to the less strenuous requirements of Kodachrome. Mel and Mrs. Jenney have two sons and a daughter. Richard is in the Class of 1952 at the Institute and on the Dean's List; Robert and Louise are both in high school. Edwin F. Delany is assistant district manager of Hedge and Mattheis Company of South Boston. He is married and has no children. Paul L. Hanson is in charge of commercial refrigeration for Kold-Draft Northwest, Inc., of Minneapolis. Paul, Jr., was graduated from Denison last year and is now a student at the Wharton School of the University of Pennsylvania where, incidentally, our own son, Alfred, is a freshman.

Last month we left the Rufe Shaw family starting their tour of Italy, of which Rufe reports further: "Naples is in ruins, there are beggars everywhere and more bandits than in all the rest of Italy. A motor bus took us to Pompeii. Here the houses are priceless and the paintings and frescoes are exactly as they were when the Romans lived there. From Pompeii we took the Amalfi drive, another Grande Corniche only a little more spectacular. We could see Salerno across the bay. It is entirely rebuilt but I marvel that anyone would try and capture it from the sea. Almost all the Italians have a liking for Americans. They say Americans always gave them a square deal, fed them well, gave them movies and sports, set up a government in the country, turned the policing over to local constabulary and then pulled out. They are free and very proud of it. A night at Sorrento and we went to Capri. This is a place to come back to. The nearest thing that we have to it is Catalina. Our hotel was on top of a cliff 1,500 feet high. We ate out of doors, danced on a veranda overlooking the bay and the cost was \$8 per day, including meals. Swimming was swell—the Blue Grotto is all that it is cracked up to be. We retraced our steps to Rome and took a motor trip through the hill towns. That was a waste of time. Then to Florence which was destroyed by the Germans to keep the Americans at bay. It is dirty and still in ruins. The Ponte Vecchio and the cathedral are still there but that is about all. Then on to Milan via the "Rapido," a multiple unit railroad train running at about 80 or 90 miles per hour and averaging better than 70 between the two towns. It floats along like an automobile on a concrete road; it is completely air-conditioned and there is no noise, no dirt." (To be continued.)

This isn't a good month to indulge in many of those hobbies and it would be a fine time to dash off that questionnaire to your secretary. Thanks a million! —CAROLE A. CLARKE, Secretary, International Standard Trading Corporation, 67 Broad Street, New York 4, N.Y.

• 1923 •

Bernard E. Proctor, Professor of Food Technology at M.I.T., was elected chairman in November of the American Chemical Society's division of agricultural and food chemistry.

Dorothy W. Weeks, Professor of Physics at Wilson College, Chambersburg, Pa., was scheduled to address the American

Association of University Women at Portsmouth, Va., in October. The announcement in the Norfolk, Va., *Ledger-Dispatch* on October 27 gives a thumbnail sketch of Dr. Week's career, mentioning that after graduation from Wellesley College she received master's degrees at M.I.T. and Simmons College and later a Ph.D. from M.I.T.; has been a technical expert for the United States Civil Service Commission, and during the war was technical aide in the liaison office of the Office of Scientific Research and Development.

In December, I had the pleasant opportunity of visiting with Bernardo Elosúa in Monterrey, Nuevo León, Mexico. He is secretary of the M.I.T. Club of Monterrey and both he and Ramón Muñoz '09, President of the Club, turned out to greet me on my arrival there. Of particular interest to M.I.T. men, there is the fine new engineering school, the Instituto Tecnológico y de Estudios Superiores. In the organization and establishment of this, Technology men have played an important part. Elosúa is a member of the board of directors of the Instituto and I had the pleasure of being shown through the modern plant of the school during my visit. Elosúa is manager of Ladrillera Monterrey, a ceramic plant. He has four daughters and three sons and is also a proud grandfather.

On the same trip, I spent two days in San Antonio and had a visit with Jack W. Beretta. Jack is president of the First National Bank and is quite proud of the fact that while the bank is housed in one of the oldest buildings in town, it has some of the most modern features; such as drive-in tellers' windows, involving a patented window mechanism, one of Jack's own inventions which is widely used by other banking institutions.

I am sorry to report the death of Louis F. Gebhardt on November 4. Gebhardt was mechanical engineer at the Watertown Arsenal. He leaves a wife, a son and a daughter. —HORATIO BOND, Secretary, National Fire Protection Association, 60 Batterymarch Street, Boston 10, Mass. HOWARD F. RUSSELL, Assistant Secretary, Improved Risk Mutuals, South Broadway, White Plains, N.Y.

• 1924 •

Among the Christmas cards this season, one of the most appropriate we have seen in years was from the Cardinal family. In one corner a pair of birds in the nest, cardinals obviously, are looking up rather wistfully at a sky full of fledglings trailing ribbons: "Paul, Jr., Montclair High School"; "Joan, Lasell Junior College"; and so on. Very effective, as well as decorative. Also, one from the Bill Robinsons, shows the whole family, including the dog, seated in front of the fireplace. One omission, not a G. E. lamp in sight. For these and for all the others you fellows so thoughtfully sent, many thanks. Each was scanned hopefully for some tidbit of news for these columns. Not a tidbit!

Further information on textilist E. C. Atwell and his move south. He is now head of the technical services section of the Burlington Mills Corporation, Greensboro, N.C. Before leaving his native heath (New England), Ev was in charge of

quality control for Textron, Inc. Two desertions to report this month. Hugh Perrin and Paul L. Wilkins have changed their class affiliations to 1923. Of course at our advanced age a move like that is difficult to understand. If it had been 1933 instead, we could figure they were just trying to recapture their youth. However, we can still claim Mrs. Hugh Perrin. Very interesting feature story about that pair in the Washington *Times-Herald* recently: "Career an Aid to Happy Home, Perrins Agree." At present, Mrs. Perrin is engaged in a project to build a flock of homes on Evelyn Walsh McLean's Friendship estate in Washington. The accompanying picture shows the two of them bent over a drafting board, using a foot rule. Caption, "Yardstick for Happiness."

Richard H. Pembroke, who has been producing *Shopping News* in various parts of the country, the most recent in Youngstown, Ohio, has shifted his scene of activities again. He's back in Boston. No details yet on the current project.

As these notes are written there's a cold wind blowing down the Charles and the gray sky looks about to open and dump a few feet of snow. We therefore think with envy of Ray Lehrer who called a short while ago to announce he was just leaving for the Caribbean and expected to see Tony Rosado and Mike Amezaga in Havana, Luis Ferre and Al Roig in Puerto Rico, and that if he could remember he would raise a glass or two to all of us on New Year's Eve at the Carib-Hilton. Sounds mighty good from here right now. The only redeeming feature is the rather smug knowledge that by the time Ray reads these lines he'll be right back here in Boston, bucking the same snowdrifts as your Secretary!

And of course it could be worse. Just think of George Tapley, for example, mushing along through the slush up there in the frozen north. Incidentally, Professor J. B. Babcock '10 says that George is looking for some bright youngsters to give him a hand up there. He's located a few likely-looking prospects and sent the information along. Maybe the M.I.T. Club of Alaska is in the making.

News seems to be a bit short this month. Either we haven't been doing much of anything or it hasn't reached the papers. Of course, in one way that could be good. All depends on what the news is. But look for better things next time. We'll have a detailed report on the Lehrer Tour and catch up on the fortunes of our Caribbean classmates — all about the latest Roig record fish, the latest Ferre industry, and how hard Mike Amezaga is working. — HENRY B. KANE, General Secretary, Room 1-272, M.I.T., Cambridge 39, Mass.

• 1925 •

We have recently received a very pleasant announcement from Mr. and Mrs. A. Foster Sanborn of Wilton, Maine, stating that their sister, Emily P. Sanborn, was married to Cyrus F. Fernald, XV, at the Congregational parsonage in Wilton, Maine, at 10:00 A.M. on November 17. The bride was educated in the schools of Wilton and Farmington State Teachers College and for several years taught in the elementary schools of Old Town. Follow-

ing the ceremony, an informal wedding breakfast was held and the couple left for a short honeymoon in Massachusetts. As many of you know, Cy is a certified public accountant and carrying on his profession in Wilton.

During the past month, a number of news clippings have been received praising the appointment of Marion W. Boyer, X, as general manager of the Atomic Energy Commission. This is no longer news but it is certainly good to hear so many nice words spoken of him.

I am sure the Class joins me in expressing our sympathy to Fred W. Greer, II, who lost his father, Jesse W. Greer, a month ago. Mr. Greer founded the J. W. Greer Company in 1917 after coming to Massachusetts from his native Texas. Fred has been president and chief engineer of the company since 1946, while Fred's brother, Don, is vice-president and general manager.

Your Secretary had the pleasure of accompanying M.I.T.'s Bursar, D. L. Rhind, to the annual meeting of the Eastern Association of College and University Business Officers held in Toronto, Canada, December 3, 4 and 5. Mr. Rhind was elected president of this organization for the coming year. While at the meeting, it was a real pleasure to encounter George L. Washington, II, who is at present the business manager at Howard University, having rather recently left his position of administrative assistant to the president of Tuskegee Institute in Alabama. — F. LEROY FOSTER, General Secretary, Room 5-105, M.I.T., Cambridge 39, Mass.

• 1926 •

Since our reunion is just around the corner, this will be the last batch of notes between now and June in which much can be discussed except the reunion. As a matter of fact, we have a message from Bill Rivers in Calcutta who is already arranging his sailing date in order to attend our reunion — shall we send Bill the distance cup in advance? Bill has been transferred from Delhi to Calcutta which sounds like a promotion to us — congratulations, old man! Charlie McHugh answered one of our cards inquiring of his activities recently, and we find him in charge of the Roll and Tank Departments of Raybestos-Manhattan, Inc., at Passaic, N.J., where he has been located for 20 years. Charlie has two boys, one 13 and one nine. Nelson Wilmot writes to us from Chicago that D. K. Taylor and Bruce Humphreville have been actively engaged in the Development Drive in that area — also that Ted Mangelsdorf has been transferred by the Texas Company to their largest refinery at Port Arthur, Texas, where he becomes superintendent. This is a fine promotion and for the Class — salutations!

Gordon Spear writes to us from Detroit: "In reply to your note regarding '26 men in this area, I can report on four. Art Benson, who has been with U. S. Rubber here in Detroit for some time, is going to Sweden for his company to assist their plant in eliminating some production difficulties. Ray Hudson has been transferred by Goodyear to their St. Marys', Ohio, plant, so has moved away from Detroit.

John Longyear is always helpful in matters pertaining to M.I.T. in this area and has been for some years honorary president of the Detroit M.I.T. Association. This was a post awarded him for his untiring efforts on behalf of the Institute over a period of years. Dave Sutter is chairman of the M.I.T. Development Drive for the Detroit area and has spent a good deal of his time on this Drive for many months. Incidentally, Dave and I plan to fly east to the reunion next June. As you know, I was elected president of the Detroit M.I.T. Association for this year, and we started things off with a meeting on October 3 at the Detroit Boat Club. Dr. Compton was here and we invited a number of prominent industrial executives for the occasion. Dave Sutter had very fine arrangements at the Boat Club. There are a number of '26 men in this area such as George D. Cummings of the Michigan State Health Laboratories and Art Underwood of the General Motors Research Laboratories whom I shall contact and report upon at some later date."

We recently had occasion to look up Marvin Pickett and found him located with Munroe Langstroth, Inc., bridgework contractors located in Norwood, Mass. The clipping services brought in a story about the New York architectural firm of Kelly and Gruzen of which B. Sumner Gruzen is a partner. The firm has recently opened an office in Boston. Our roving class reporter, Jim Killian, saw Bill Sessions and Elton Staples on a visit to Cleveland and tells us that Elton has been made a vice-president of his company, the Heavy-Duty Electric Company. This was thrilling news and we salute you, too, Elton! Three promotions to report in one issue is a record. Jack Larkin tells us that Mark Greer has also become a New Englander recently and is now living in Middle Haddam, Conn. Mark has the distribution of E. L. Wiegand products and Weston Electrical instruments in the Connecticut area.

By the time you receive this issue of The Review, you will have received preliminary announcements of our reunion and presumably an announcement of our 25-year Class Book which Harry Howard is organizing. The announcement will give you details about the proposed book but since it looks as though your class secretary will be involved in compiling the histories of each class member, we want to impress you with the importance of sending information back by return mail; that is, unless you care to have us ad lib your history, and if you have been reading these notes regularly, you can guess how dangerous that might be. — GEORGE WARREN SMITH, General Secretary, E. I. du Pont de Nemours and Company, Inc., Room 1420, 140 Federal Street, Boston, Mass.

• 1927 •

There were numerous references in the press to the marriage of Cecil Lester Jones of Washington, D.C., and Ezra Stevens. Mr. and Mrs. Stevens will make their home on Mt. Vernon Street, Boston. — John A. Swift is president of the Swift Industrial Chemical Company which is erecting a new plant in Canton, Conn. The

plant will manufacture a variety of compounds for metal treating. Prior to his present undertaking, Swift was with Crucible Steel, United States Steel and Western Electric.

In a Labor Day speech, General Dwight D. Eisenhower referred to a "campaign sponsored by private citizens to fight the big lie with the big truth." He was referring to the National Committee for a Free Europe which operates an independent radio station in Europe beamed from Western Germany to be behind the Iron Curtain. Oscar S. Cox, former deputy administrator of the Foreign Economic Administration, heads the District of Columbia activities of this group. He is a member of the law firm of Cox, Langford, Stoddard and Cutler, 1210 18th Street, N.W.

We regret to announce the death of Charles G. Jenkins, XV. He lived at Burns Road, Derby, N.Y.—JOSEPH S. HARRIS, *General Secretary*, Shell Oil Company, Inc., 50 West 50th Street, New York 20, N.Y.

• 1932 •

Just too late for the last issue, I received the following interesting letter from Lieutenant Colonel Harper: "Presently, I am on amphibious maneuvers with the Navy off the coast of North Carolina. I had just become settled in the Pentagon duties on the Army General Staff I assumed September 1. In July, I was sent to Korea from Ft. Worden, Wash., after first reporting to D.C. Was in Pusan beachhead area, on the Nakdong, until conditions were stabilized. The unit I have been assigned to the last three years, the 2d Engineer Special Brigade, at Fort Worden, Wash., went on to make the Inchon landings but I returned to the United States.

"Last spring I had the pleasure of going on Portrex amphibious maneuvers in Puerto Rico and accompanied my troops back to Fort Worden through the Panama Canal. (There will be some '32 notes on Course XVII boys before long.) Guess I will be in the Pentagon for three years barring further reassessments occasioned by war. It will suit me to light somewhere like D.C. for a spell. However, last year I did take a little leave and visited by sister in Denmark, and we made journeys to Paris and London. Her husband is air attaché in Copenhagen. Haven't run across any classmates in some time. Will fly to Boston some week end and look around, though."

It would certainly be a pleasure to have several letters such as Jim's to put in these notes each month. Just send your letter to me at the following address.—CLARENCE M. CHASE, JR., *General Secretary*, 1424 East 7th Street, Plainfield, N.J. *Assistant Secretaries*: CARROLL L. WILSON, Cannondale, Conn.; WILLIAM A. KIRKPATRICK, Allied Paper Mills, Kalamazoo, Mich.

• 1936 •

Jim Craig sends his best to everyone, and he is going to try to make the 15th reunion. Jim tells us he sees Ed Boyan occasionally, and that he has a fine little daughter. Henry Johnson advises that

he has changed from the finance department of Philco to the finance department of the Ford Motor Company, and is now living in Franklin, Mich.; and he adds that he hopes to be at the reunion. Ariel Thomas writes that he hopes to be at the reunion, too, and goes on to tell us that he gave up teaching at M.I.T. and is now with the water pollution control division of the U. S. Public Health Service, where a survey of resources is now under way in New England and New York.

Art Sarvis reports that he spends a good bit of time on the road for a management consulting firm in Chicago, and that his trips are confined to the Midwest and South; therefore, he doesn't plan to get to the reunion but sends best regards to all of us. Roger LeBlanc, who has offered to help El Koontz on the publicity subcommittee for the reunion, hopes to see more classmates at our 15th than he did at our 10th—let's not disappoint him! Incidentally, Roger is now vice-president of J. J. Moreau and Sons, Inc., Manchester, N.H., a wholesale-retail builders hardware establishment. Also, he is acting as treasurer of the Acme Realty Company. Roger has been married 10 years and has two boys and a girl. Py Williams is still plant engineer for Robertson Paper Box Company, Montville, Conn., and has kindly offered to give all the help he can—he is currently assisting El Koontz with reunion plans. We certainly appreciate the co-operation you fellows are giving us, which we hope will result in the "best reunion ever." Jim Stewart tells us he has just returned from a 15,000-mile, house-trailer trip with his family through the U.S.A., Canada, and Mexico. He also visited Bob Sawyer in Eugene, Ore. Must have been a wonderful experience, Jim, and hope you make the reunion so you can tell us all about it! Bob Gillette is now with the Rock of Ages Corporation, Barre, Vt. If all goes well, he will see us in June—try to make it. Bob! Bus Schulman writes from Dallas, Texas: "Dallas appears to be a stopping point for all transcontinental air travel. If any of the boys are coming through, I'd surely like to see them." Bus adds that he hopes a business trip might bring him to Boston next June—he enjoyed our 10th reunion and would like to join us at our 15th. Hope things work out so you can, Bus, and if any of us get to Dallas we'll be sure to get in touch with you—we would like to see you, too! John Rowan reports that he has been in Sarnia, Ontario, Canada, for the last two years and that he is in charge of the construction section of the engineering and development division of Imperial Oil, Limited. His company is going through a large expansion program which makes it impossible for him to determine whether he can be with us in June. However, he does say: "It is a long time since I have seen any of our classmates and surely hope I can attend the 15th reunion." We do, too, John.

Paul Robbins is executive director of the National Society of Professional Engineers, with offices in Washington. He reports that during his business trips he frequently sees M.I.T. Alumni as well as members of the Class of '36—he has every hope of seeing all of us in June! Fred Prahl is with the United Shoe in Boston, as he

has been most of the time since graduation, and he is giving his services as a "local boy" in connection with plans for the reunion. He tells us that they "have practically had a 'Class of 1936 Group' here for the past few years. Bill Prichard, Elmer Davis, Elliot Robinson, Al Klemka, Bob Gillette and myself were all here during 1947 and 1948." Since that time, however, Al Klemka has left and is now with the Behr-Manning Company in Troy, N.Y.; Bob Gillette, as mentioned earlier in the notes, is now in Vermont. Fred continues to say that he sees Francis Peterson occasionally during the summer. Francis is editor of the Texaco Research Laboratory house organ, and is located in Fishkill, N.Y. Fred also saw Paul Richardson sometime ago, and at that time Paul was with Paragon Gear Works, Inc., south of Boston. Ollie Angevine, from reports last received by Fred, is heading Stromberg-Carlson's telephone work in Rochester, N.Y. Thanks for so much news, Fred! Jim Grove, President of the Grove Laboratories, Inc., St. Louis, Mo., states: "I do not have many suggestions for the reunion except to say that I hope there will not be too many long-winded speeches. As a matter of fact, it would be better if there weren't any speeches at all! But I suppose this is too much to hope for." He does expect to attend, however!

Bill Garth, President of the Graphic Arts Research Foundation of Cambridge, has been elected to the board of trustees of the Boston Museum of Science. Congratulations, Bill! Congratulations to Jim Vanderpool, who resides in Waldoboro, Maine, and recently was elected to membership in the Maine Association of Engineers. This signal honor was given in recognition of Jim's designs for power plants which have recently been constructed in Maine. He has just completed a plant at Guilford which was considered a very difficult feat of engineering. Earlier this year, he designed a plant at Locks Mills for the Ecco Products Corporation.

El Koontz reports additional volunteers to serve on the publicity subcommittee in connection with the 15th reunion, as follows: George Parkhurst, Gus Chandler, Dorian Shainin, Mal Graves, Py Williams, Al Horton, Gerry Chapman, Norton Miner, Ken Swain, Stan Freeman, Bob Gillette, Jack Hamilton, Brent Lowe, George Robinson, Dana Devereux, Pete Peterson, J. T. Smith, Ford Boulware, Henry McGrath, Roger LeBlanc, W. V. Osgood, Julian Rifkin, A. B. Gray, John Coffin, George Trimble, Harry Essley, Jack Hamilton, and Leonard Stoloff. Although your response to help El Koontz has been fine, he is still looking forward to hearing from more of you fellows!

Fletch Thornton is working hard as reunion chairman, with good results so far, but he needs all the assistance possible, so don't let him down, boys! He will have a full report for you on the progress of the arrangements for the reunion in the March issue of *The Review*—so be on the lookout for it.

That's all for now—continue to write and your Secretary will keep the news flowing.—ROBERT E. WORDEN, *Secretary*, Fidelity-Philadelphia Trust Building, Philadelphia 9, Pa.

● 1940 ●

Miriam Lackey and Oliver K. Smith were married in Los Angeles, Calif., on September 16. Ann P. Walker was wed to Edmond P. Di Giannantonio on November 11 in New York City. Ed is a lieutenant commander in the United States Naval Reserve and at present is attached to the Armed Forces Information and Education Division of the Office of Defense in Washington, D.C.

Just as these notes were being prepared, I received a letter from Joe Wiley saying that he had recently visited Pete Sosa '41 who is quite seriously ill and has been at the Kings Park State Hospital, Kings Park, Long Island, N.Y., for the past three years. Pete would welcome letters from his M.I.T. friends.

Don't forget your class dues (50 cents for one year or \$2.50 for five years) and please send in some news for this column. It can only be written with the help of each of the class members. — ALVIN GUTTAG, *General Secretary*, 7114 Marion Lane, Bethesda 14, Md. MARSHALL D. McCUEN, *Assistant Secretary*, Oldsmobile Division, General Motors Corporation, Lansing 21, Mich.

● 1941 ●

From special correspondent Hank Avery at Cabot, Inc., in Boston, we hear that "Stan Zdonik, a chemical engineer with E. B. Badger and Sons, is coauthor of a section in the *Chemical Engineers Handbook* entitled, 'Azeotropic and Extractive Distillations.' Ray Harper, who is with Dewey and Almy Chemical Company, reports the birth of a second son, Randall. A. W. Fisher is this year's chairman of the ichthyologists, Boston section of the American Institute of Chemical Engineers. Hank Avery is secretary of the same society. At a recent meeting of the society, '41 was represented by Jack Lyons of the A. C. Lawrence Leather Company, Thayer Rudd of Dewey and Almy Chemical Company, and Ted Ferris. Sam McCauley is attending M.I.T. again on a Sloan Fellowship. Herb Moody is the proud father of Carl Edward Moody, born on May 28, 1950."

From Ivor Collins, a stalwart supporter of this column: "Bill Fox is now at 1934 Edgewood Road, Towson 4, Md. Carl Aronsen, still in New York at last writing, spent a week end with us this summer while his wife was in Oregon. Gardner Ketchum is still with General Electric in Schenectady — saw him at the A.S.M.E. convention in New York City on November 27. At the chemical and pigment division of the Glidden Company in Baltimore, Irv Foote, formerly assistant plant manager and superintendent of the lithopone plant, has been appointed plant engineer of the division."

And from Ivor's last letter, some older news (our fault to be sure, for it was current when we got it): "Ben Thorn is with International G.E. as turbine specialist. I saw quite a bit of him and his wife and two children when we were wound up in the school situation there. John Macleod is in the construction materials division of G.E. in Schenectady. I used to see him at M.I.T. club meetings quite often. We

came to Lynn around the first of the year and I went into the G.E. meter and instrument division. I'm in charge of the lab section which sample-checks all the lines of production of the plant: watt-hour and demand meters; time switches; thermostats; exposure meters; and quite a good deal of specialty instruments such as cycle recorders, galvanometers, photoelectric recorders, and so on." We recently received word that our former roommate, Ken Fox '40, was just named a vice-president of Burlington Mills Corporation. Ken has been president of Lowell Textile Institute for the last five years, following a stretch as an assistant professor in the Mechanical Engineering Department, Textile Division, at the Institute.

Norm Michels is now located in Pittsburgh and Walter Hudson in Colorado Springs, Colo. Dave Howard has moved to Cohasset, Mass., and Hamilton Johnson to Cuyahoga Falls, Ohio. We occasionally meet Les Klein in the Institute halls; Les has moved out to North Randolph, Mass., and is with the A.E.C. John Lof is located at the Institute, also. Martha Pugh recently became Mrs. George Harrington. The Harringtons planned a trip to Europe before settling in Wilmington, Dela., where George works for the Du Pont Company. Martha graduated from the Katharine Gibbs School and has been with the *New Yorker* magazine.

May we mention the 10th reunion again? Present at the 9th were: Mike Driscoll, Ed Hayes, Bill Hooper, Lew Jester, Sam McCauley, Howard McMahon, Ed Marden, Irv Meyers, Max Schweinhaut, Dirk VanDongen, Ted Walkowicz, and John Wulff. Needless to say, we look forward to having these fellows joined by a major part of the Class in our first weekend reunion since graduation. It will be a relaxing and interesting two days, so start planning in a preliminary way now. If you haven't received details, please contact Reid Weedon, 10th Reunion General Chairman, 4 Overlook Way, Winchester, Mass. — STANLEY BACKER, *General Secretary*, 383A Harvard Street, Cambridge, Mass. JOHAN M. ANDERSEN, *Assistant Secretary*, Saddle Hill Farm, Hopkinton, Mass.

● 1944 (10-44) ●

As the first of this year's guest editors, let me present King Cayce. He came through as a true friend and class spirited alumnus. Please notice how a job is well done; you, wherever you are, may be called on soon:

"Bruce Fabens and Ann Caldwell of Tennessee were married in the summer of 1949 and are now living in Bay Village in a new home surrounded by a Fabens-made picket fence with 593 pickets. Bruce is working for the Lamson and Sessions Company and is now head of the inspection department. Incidentally, they expect to be joined by a third Fabens, shortly. Ted Hellmuth, best remembered for his fire escape escapades at the Graduate House during V-12 days, was married to Dorothy Marshall of this city early this past summer. They spent their wedding trip at Sea Island, Ga., and are now living in Beachwood Village. Ted is selling paper for the Hubbs and Howe Company.

Mal and Nina Crowther came over from Toledo for the wedding. Rey Gamundi, who was a class ahead of us but well remembered by our class for his activities in 'P' Clubbing and *VooDoo* drawing is living in Mayfield Heights with his wife Cynthia and son and heir Rennie. Rey is with the general research division of Eaton Manufacturing Company and is very active on the magnetic clutch which has been so widely publicized.

"You will recall our meeting on Staten Island in the summer of 1948 when Al Rose and Betty Zentgraff were married. I was an usher for Al, and Pat Staley was a bridesmaid for Betty. Pat and I were married the next summer. We have since bought an old house — must be 50 years old — in Lakewood. We are remodeling it. Pat is an interior decorator so she dreams up the ideas and we both do the work. Though we are still torn up, we would be very glad to see anyone who comes through these parts. We have extra room and can probably find an extra hammer or saw.

"Dave Reeves is working for Lily-Tulip Cup Corporation in New York. Pat and I have made two trips to the Cape to visit Nan and Len Carlson '47. They are confirmed Cape dwellers and have a wonderful spot to enjoy their week ends in Brewster. They got their first deduction just under the wire — in December of last year. Dick Jorgenson '45 was married this summer in Chicago. I saw him at the Cleveland Hotel. He and his wife are now settled in Lakewood near Cleveland.

"Bob and Ellen Horsburgh were last heard from living in Pittsburgh where Bob was working for the Pittsburgh Plate Glass Company. I saw Stan Brown '45 at the Machine Tool Show in Chicago four or five years ago. At that time, Stan was working for New Britain Gridley Machine Division in New Britain, Conn. He and Lil had just purchased a house in Southington. I talked with Charlie Lenhard the other night. He is married, lives on the west side of Cleveland, and is working for Standard Oil Company as a plant engineer in their can plant."

At Annette's on 2d Avenue and 51st Street, where they serve some of the best food in the country, I saw the discerning gourmet, Bob Solari '47, lunching with the Shell chemical sales force. Bob is selling for Shell in Chicago where he settled with the former Patricia Jarchaw. I regularly see Seward Kennedy, 2-46, at the New York Athletic Club. He was scheduled to get his law degree from New York University this January.

By this time, 1951 is well under way and I hope it is a happy and successful year for all of you. — JAMES S. MULHOLLAND, JR., *General Secretary*, Reinhold Publishing Corporation, 330 West 42d Street, New York, N.Y. *Assistant Secretaries*: JAMES B. ANCELL, 35 Webster Street, West Newton 65, Mass.; RODERICK L. HARRIS, 155 Spring Lane, Levittown, N.Y.

● 1946 (2-46) ●

In about five months — the week end of June 9 — our five-year reunion will take place. Briefly, a full schedule of activities is planned, including a cocktail party, banquet, water-borne excursion and pic-

nic, and a variety night. We've made arrangements to engage the entire facilities of the new dormitory, the Everett Moore Baker House. It will be here that attending classmates and their wives will stay, and where most of the festivities will be held. The excursion and picnic deserve another word; chartered boats will take our party from the steps of the Institute to a pleasant outer-harbor island for picnicking. This information and more about the reunion is contained in a recent bulletin from the Reunion Committee. If the address we have for you is out of date, or if you just haven't received the bulletin and would like all the information, write to Committee Chairman Ted Heuchling, Building 32, M.I.T., Cambridge 39.

Presson Scott Shane and Emily Baker of Shaker Heights, Ohio, were married in October. Presson is a University of Kansas graduate who took his master's studies with us. Al Litchfield and Libby Stoklasa of Dallas, Texas, also were principals in an October wedding. Obie Denison '11 has informed us of the marriage of John D. Whitehead to Patricia Palmer of Eastport, Maine, in November. John, a lieutenant, jg., is at the Naval Air Station at Quonset, R.I. Dr. and Mrs. Roger B. Hickler, married in September, are living in Boston at 497 Huntington Avenue while Roger is assistant resident at Peter Bent Brigham Hospital.

Recent betrothals include: Jack Halladay, Jr., and Barbara Kinzer of Arcadia, Calif.; Fred Fuller and Dorothy Mayo of Glen Ellyn, Ill.; and John Wandrisco and Virginia Saxman of Latrobe, Pa. Fred and Johnny received their M.B.A.'s with your Secretary at Harvard Business School. Fred is in the Chicago area and Johnny's with the Precision Screw Machine Products Company in Waterbury, Conn. — The arrival of sons to two classmates is of particular note: Herbert Gerald Keating, 3d, to Herb and Mary Keating on September 11; and Stuart MacLeod Jackson to Bill and Mary Jackson on November 5.

Future "flyboys" are H. A. Gray and Larry Body, both lieutenants, jg., who are training at Pensacola, Fla. Word from Larry's mother is that Larry's solo flight is a thing of the past. From the news item about H. A.'s training, which tells of a night flying course, your Secretary wonders if they let Harland out in the daytime. Wot say, H. A. P. — **JAMES S. CRAIG, General Secretary, 387 Harvard Street, Cambridge 38, Mass.**

• 1947 •

Dick Cotton '49, who started his Technology career with '47, and wife Joan, entertained a group of Providence and Boston friends at a cocktail party following the Harvard-Brown game, late in the season. It was there that I met George Katz, whom I haven't seen since graduation. George was sporting a shining gold ensign's stripe on his navy-blue uniform, with the insignia of the supply corps above it. When I met him, he had just entered active duty, and was still attending supply school, while waiting for orders which he expected by the first of the year. George had recently received a business degree from Columbia, whence he

brought word of statistician Jack Kiefer, who will be Dr. Kiefer, momentarily.

The following week, I was present at a wake following the Harvard-Yale game, and there was pounced upon by Ed Kane — sorry, Killer Kane — who had driven up to Boston with his spouse from Meriden, Conn. Ed was his usual buoyant self, full of anecdotes about his former chemical engineering cronies in the Buffalo-Niagara Falls area, including Barry Brown and Watt Webb. We see by our clippings, by the way, that Watt was married on Thanksgiving Day to Page Chapman of New York.

By now you will all have received our first news letter containing some vital statistics about various classmates. This, of course, is a result of those questionnaires we sent out last spring, and if there are any complaints as to the elapsed time between receipt of the questionnaire and the issuance of the letter, well, all I can say is, "these things take time." I trust also that all of you have been visited at one time or another by a member of the M.I.T. Development Fund. My happy chores as a solicitor have given me an opportunity to visit some of our fellow graduates. I discovered that Larry Powell, who is an enthusiastic participant in class affairs, lives very close to me in Brookline, and I spent a very pleasant hour chatting with him and his wife, Phyllis. Bob Warner, who takes his annual vacation in the winter, and whipped down to Florida (Miami) to visit his family at Christmas, and Al Richardson were also on my list of contributors to the Development Fund.

Actually, soliciting the latter two was mere laziness on my part as we work in the same lab here at the Institute. And when it comes to that, it seems that there is a high density of '47 men in the office — the Aeroelastic and Structures Research Laboratory, to be specific — so when I'm short of material for this column, I can always talk about my colleagues. First and foremost, I had better mention, and quickly, that Gabe Isackson was married last October to Ann Kaplan of Bridgeport, Conn. Gabe is my boss, and I can't imagine how I have failed to mention his splicing earlier. The couple were wed in Montreal and then motored all the way down through the Smoky Mountain Park on their honeymoon. Marty Schwartz, another of the '47 population in the office got his doctor's degree last fall; and to celebrate, bought a house in Lexington and recently moved in. Marty is a father with a vengeance — he has three youngsters. Ken Wetmore and Tim O'Brien round out the personnel from our Class in the lab. Larry Stumpf was out here from his job with Douglas Aircraft in California on some hush-hush business at the supersonic tunnel.

Two classmates on the way up are Tom Hadley and Herb Wieland. Tom has recently joined the Cambridge firm of R. M. Bradley and Company after city-planning work at Oak Ridge, Tenn., and in New York State. Herb was named last November as executive director of the Hartford Redevelopment Agency, also a city-planning organization. Herb brings experience with him as a senior project planner and principal architect for the

Massachusetts State Housing Board in veterans' housing development and has participated in city and town planning for Rocky Hill, Brockton and Manchester.

On a recent business trip to Wright Field in Dayton, Ohio, I was very surprised to be greeted one morning in the lobby of the Dayton Biltmore by George McLafferty. George was attending a seminar at the field on diffusers at which he presented a paper on work he is doing with United Aircraft in Hartford, Conn. Another U.A.C. engineer, Jim Van Meter, dropped in to see me one Sunday not too long ago. Jim had come to Boston to attend a symphony concert and had time to stay for lunch and a good, long breeze session before concert time. I received a Christmas card from Lieutenant Myron Thomason with a return address in care of Postmaster, San Francisco. The card was postmarked, Independence, Mo., Myron's home town, but we can't conjecture as to where Myron is now.

I was fortunate in receiving an invitation to the first annual Christmas party given by *The Tech* at the Hotel Kenmore last December. Arnold Judson and wife, June, were also there; in fact, we had dinner at the Judsons' apartment in Allston before the affair. Arnold is now assistant personnel manager at Polaroid where he has been engaged in publishing a house organ called *The Polariscope*. His experience as general manager and editor of *The Tech* should stand him in good stead.

Engagements to report are few, but weddings are proportionately higher. Engaged are: Terence Mullen and Edna Jane Esposito of Larchmont, N.Y.; Dick Whelan and Nancy Eleanor Johnson of Belfast, Maine; and Arnold Seigel and Rhoda Ottenberg of Washington, D.C. Arnold is at present studying at the University of Amsterdam in the Netherlands.

Don Harleman and Martha Jane Havens of Honaker, Va., were married on October 21 in Sudbury. Ushers included: Harlow Farmer '48, who is with the Woods Hole Oceanographic Institute; '47 was represented by Jim Polychrone, an assistant professor in Course XVII, and Alfred Matter, who is with the International Bank for Reconstruction and Development in Washington, D.C. Best man was Don's former roommate, Russ Johnston, an assistant professor of civil engineering at Lehigh University. The Harlemans traveled through Maine and Canada on their honeymoon and have made their home at 20 Joy Street, Boston. Don is an assistant professor of hydraulics at the Institute. Marty attended Stevens College and Katharine Gibbs School. Spotted among the guests during the reception were Gene Gettel and his wife, the former Gertrude Nightingale. Gene is with United Aircraft in East Hartford.

Other weddings of which we have had word are those of: Joe Berberich and Mary Patricia Higgins of Lawrence; Joe Profita and Margaret Dudley Hall of Wollaston; Bill Whitehill and Florence Elizabeth McKane of South Berwick, Maine; Martin Haas and Elizabeth Taylor of Winthrop; John Bradley and Jane Dysart Carpenter of Malden; Ted Dyett and Adrienne Inez Murray of Watertown; Joe

Engstrand and Eva Jennette Price of Pauls Valley, Okla.; Bill Adams and Doris Ellen Taylor of Bethlehem, Pa.; Mike Daly and Leona Curley of Waterbury, Conn.; Jim Barber and Jacqueline Perry Waite of Mt. Vernon, Ill.; and Bob Hagopian and Dr. Mary Eden of Istanbul, Turkey.

We have further word on the very unfortunate death of Bill Crecraft which was reported in the obituary column of the November issue. Bill was killed when the car he was driving skidded and struck a bridge abutment near Putnam, Ind. — CLAUDE W. BRENNER, *General Secretary*, Room 33-316, M.I.T., Cambridge 39, Mass.

• 1948 •

Robert Welsh was wed in October to Margaret Stueck, a graduate of Wellesley, and is now residing at 71 Long Hill Street, in Springfield, Mass. In November, David Hamblen, an electrical engineering graduate, was married to Shirley Tolman; Stuart Thayer to Marilyn Rossbach; and Frederick Lofgren, currently an electrical engineer with Raytheon, to Marilyn Keegan.

Several other men of '48 have taken the initial step and have announced their betrothal (as the news clippings phrase it) since our last writing. In Philadelphia, Conrad Knerr became engaged to Shirley Ketcham; Bob Cadieu to Mary Francis Leach; and a co-ed, Rosemary Durnan, to Luciano Carlo Scala of Rome and Bologna.

News from the industrial front brings us word of the promotion of three '48 men. Armand Feigenbaum has been named to the staff of the manager of General Electric Company's aircraft gas turbine divisions at Lynn. He is also studying for his doctorate at the Institute and will continue his G.E. activities on quality control. Robert Ginivan, who is associate director of the Worcester chapter of the National Association of Cost Accountants, has been appointed to the post of transportation engineer for the Worcester Street Railway Company. Hugh Craigie, who was formerly connected with the internal auditing department of Sylvania Electric

Products, Inc. has assumed the position of controller for Holiday Brands, Inc., in Walpole.

A letter from Bill Joyce brings us the sad news that Jim Graziadei of Pelham, N.Y., was killed in an automobile accident in the suburbs of Philadelphia early on the morning of November 20. At the time of his death, Jim was an assistant superintendent for the Turner Construction Company in Philadelphia.

I fear that this is all the news that has crossed our desk this past month — any and all donations for future issues gladly accepted. — WILLIAM R. ZIMMERMAN, *General Secretary*, in care of Kurt Salmon Associates, Inc., 3000 Albemarle Street, Washington, D.C. RICHARD H. HARRIS, *Assistant Secretary*, 19 Lancaster Street, Worcester, Mass.

• 1950 •

Life at Dix seems to become more enjoyable as more and more of our Technology boys arrive. Gene Comeau (one of Pritchett Lounge's best men) arrived two weeks ago. Gene received a letter from Barney Byrne stating that Barney has finally settled down to some serious work. Wilbur White moved in next door yesterday and brought some news of Boston with him. He was working with Fay Spofford and Thorndike in Boston. Paul Berger and Jim Watt were also employed there. Tom Totsi and Phil Lynn, "Loyal Civils" from the Class of '49, also helped to make Bill's job enjoyable. Seems like half of the civils from M.I.T. are working at Fay Spofford and Thorndike. Frank Ferrigno and Bob Haass are also stationed here at Dix. We are all scheduled to go to Fort Meyer after basic training for classification.

I only have news of a few engagements this month. They are as follows: Barbara Ann Newman of Lynn to Fred Lorenzen, also of Lynn. Fred is presently employed by the Raytheon Manufacturing Company and is pursuing an evening graduate course at Boston University. Anne Chalmers Rossie of Cambridge to John Herbert Bickford of Manchester, Conn. Anne is now a fifth-year student in the School of Architecture at Technology. John is work-

ing with Landers, Frary and Clark in New Britain, Conn.

I have also received clippings of a few weddings: Elizabeth Anne Moses of Winchester became the bride of George Merrow, also from Winchester. Rosemary Cynthia Kornstadt was wed to William John Lueckel. Will is now employed as an analytical engineer for United Aircraft Corporation in Hartford, Conn. Joyce Spaulding of Georgetown, Mass., was wed to William R. Dagnall of Columbus Grove, Ohio. He is employed by the Western Condensing Company of Lima, Ohio, and the happy couple will make their home in Columbus Grove. Miriam Lemp and William Thomas Morris were wed in a double ring ceremony and will reside in Forest Hills, L.I. William is a sales analyst for the American Brake Shoe Company and a designer for Seampers Company, Inc. Elva Mae Williams and Ralph William Hall were wed and they will take up residence in Brooklyn, N.Y. Last, but not least, my good friends Doug Cook and Ann Maloney finally tied the wedding knot. After honeymooning in Bermuda, Doug and Ann are making their home at North Muskegon, Mich. The best of luck to all you newly married couples.

John Litchfield has taken a position as food technologist with a large packing plant in Hollywood, Fla. Rudolf Zillmann is now associated with the Pittsburgh Steel Foundry Corporation of Glassport, Pa. Dick Henderson dropped me a line telling me of all the wonders of being a civilian. From the way Dick talks, his plant is just like the Technology chem labs. If you are ever in New York, you can stop at Fordham Skating Rink on most any evening and find Civilian Henderson gliding along on his skates. (Or on something else.)

As for news concerning the rest of you — I made a plea a while back for letters telling about yourselves or your buddies. How about sitting down and telling us about yourself? My address here at Dix is indefinite, so please send all mail to the following address. Thank you for your letters. — JOHN T. WEAVER, *General Secretary*, 1772 East Tremont Avenue, Bronx 60, N.Y.

Monday, June 11, 1951 is Alumni Day at M.I.T.

Set this date aside—now—for:

- ★ **Luncheon in Du Pont Court**
- ★ **Departmental reunions and forums**
- ★ **President Killian's Open-House Reception**
- ★ **The Alumni Banquet at the Copley Plaza in Boston**
- ★ **A new souvenir Stein to add to your growing collection**

What GENERAL ELECTRIC People Are Saying

W. R. G. BAKER

Vice President, Electronics Department

CIVIL DEFENSE: No longer do oceans and distance protect us from any determined and ruthless enemy who possesses atomic weapons. Are we then tilting at windmills if we take precautions to eliminate surprise, confine the damage, and alleviate sufferings of the wounded? I sincerely think not.

We maintain police and fire departments, and do not rebel at the expense because there are no hold-ups or fires. Can anyone who has lived through the years after the war and watched the march of Communism in Europe and Asia say that we are not in real danger? The communities . . . should seize the initiative in planning on a local level for . . . protection of their citizens against not only the threat of atomic weapons but other disasters resulting from sabotage, fire, flood, or pestilence.

We should accept this responsibility, not through fear, but because we are men enough, American enough, to recognize and face grim reality, and deal with the problem of safeguarding our families and our neighbors.

*Utica, New York
November 13, 1950*

★

M. A. EDWARDS

General Engineering & Consulting Laboratory

FIELD PLOTTER: Direct solution of many theoretical and practical problems in the electrical, mechanical, thermal, hydrodynamic and aerodynamic fields, has been simplified by a field plotter recently developed.

Consisting basically of a thin sheet of graphite-impregnated paper, 6-volt d-c power source, voltage divider, sensitive microammeter, and potential-exploring stylus, the instrument offers graphic solutions by simple analogy methods. Patterns to be established can be controlled by metallic electrodes, silver conducting paint, or cut-out areas on the paper with boundary condi-

tions in accordance with the problem. Equipotential lines on the paper are located with the stylus by a series of punch marks at zero readings of the microammeter, and can later be intensified with white ink. This instrument has proved highly satisfactory for making studies of intricate or irregular boundary shapes which would otherwise have required tedious, point-by-point mathematical calculations.

*American Association for
the Advancement of Science
Cleveland, Ohio
December 26, 1950*

★

J. W. RAYNOLDS

Chemical Department

SILICONES: The first silicone rubbers were useful because of the high and low temperature stability, together with good oil resistance, ozone resistance, and considerable chemical resistance. From a rubber man's viewpoint, silicone rubber was miserable to handle. It would not band on the mill. Pigments and fillers were difficult to combine. Curing temperatures ranged up to 400° F with time cycles up to 72 hours . . .

During the past year, our research and development engineers have been making steady progress in perfecting some new silicone rubber polymers and compounds. These new materials look, feel, and handle more like the natural rubber products. They also possess the excellent high and low temperature characteristics for which silicone rubbers are especially noted.

The new silicone rubber has over twice the elongation and tensile strength of the old product. It handles easily on a cool rubber mill.

It can be calendered, extruded, or molded by compression, transfer, or injection processes, and has curing cycles as short as one minute at 300° F.

*American Chemical Society
Los Angeles, California
November 7, 1950*

★

K. C. SEEGER

J. H. OLIVER

Apparatus Department

RADIANT CHICKEN BROODING: Repeated tests in the midwest, in New York State, and at the University of Delaware have proved that high air temperatures are not necessary for the successful brooding of chicks, provided they receive sufficient radiant energy to keep them warm. These conclusive tests were carried to the extreme of brooding baby chicks in air temperature of 15° F below zero. In this extreme test, 30 chicks were placed in a cold storage plant where air temperatures are maintained at 5° to 15° F below zero. At the end of two weeks, the 30 chicks, all alive, were larger, 1.9 pounds per 100 heavier, and better feathered than others of the same hatch, which were brooded in the conventional manner in a warm room under coal stove brooders.

Four 250-watt infrared lamps . . . 18 inches above the litter . . . supplied the radiant energy that kept them comfortable at all times. Radiant energy at chick level measured 2.62 btu per square inch. This heated the chicks but contributed little heat to the jars of water, so that half of the water in the jars was frozen.

*American Society of
Agricultural Engineers
Chicago, Illinois
December 18, 1950*

You can put your confidence in—

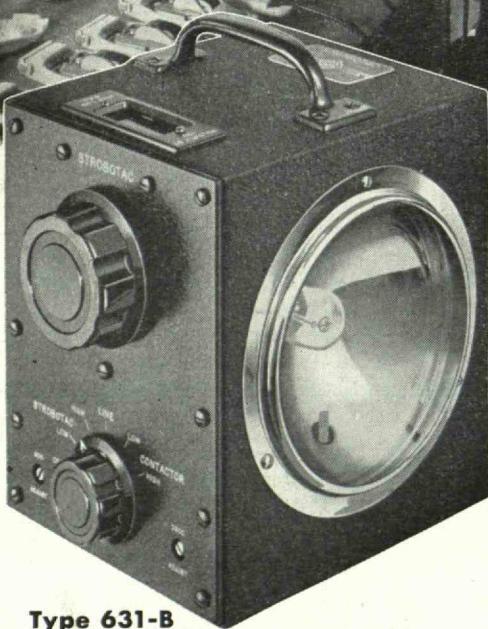
GENERAL ELECTRIC



from HEDGES

to WHISKERS

Photo Courtesy Remington Rand, Inc.



Type 631-B
STROBOTAC®

Direct-Reading Speed Range: from 600 to 14,400 per minute—stops motion from 100 to 100,000 rpm

Flash Duration: between 5 and 10 millionths of a second

Power Source: any 115 volt, 60 cycle a-c line

Power Input: 25 watts

Dimensions: 7½ x 8¾ x 9¾ inches

Weight: 9½ lbs.

Price: \$140.00

The TRIMZIT Electric Hedge Trimmer, manufactured by The Electric Sprayit Company of Sheboygan, Wisconsin was designed with the help of a G-R STROBOTAC. The hedge and lawn trimmer has reciprocating cutting blades. The STROBOTAC enabled the research department of the company to obtain operating analyses of the *exact* characteristics of movement of the cutters . . . merely by pointing the STROBOTAC's beam at the blades and turning the control knob until the blades appeared to move in slow motion.

It would have been extremely difficult, if not impossible, to analyze this motion without the aid of the STROBOTAC.

The Electric Sprayit Company also use the STROBOTAC regularly on its production line to give the trimmers a final speed check.

Hundreds of manufacturers are becoming aware of the unique possibilities offered by the STROBOTAC in getting real assistance not only in research, design, production and maintenance, but also in sales demonstrations.

We'd like to tell you more. Just write for your copy of **EYES FOR INDUSTRY**, without obligation of course.

GENERAL RADIO COMPANY

90 West St., New York 6 920 S. Michigan Ave., Chicago 5 1000 N. Seward St., Los Angeles 38

Cambridge 39,
Massachusetts

